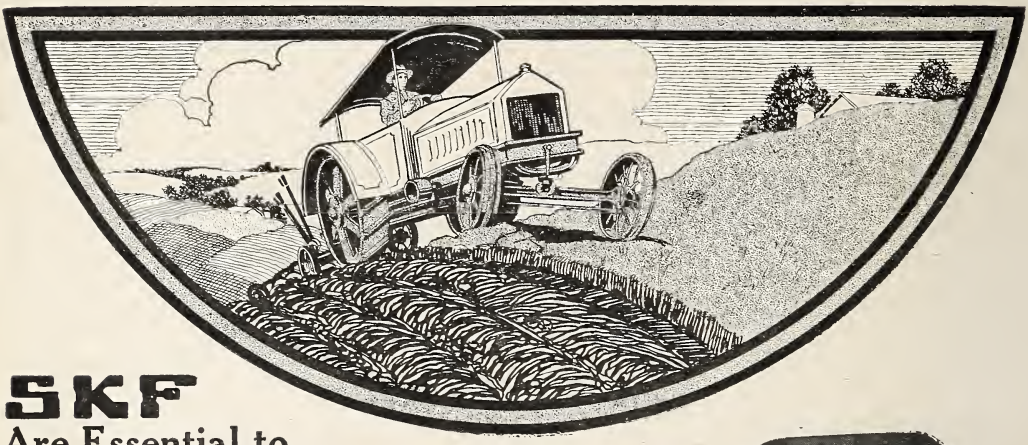
The TRACTOR FIELD BOOK

MASONIC TEMPLE — CHICAGO
1919

SKF
BALL BEARINGS

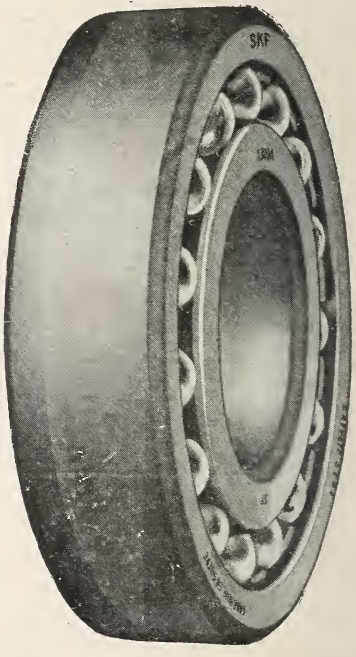


SKF
Are Essential to Maximum Tractor Service

WHEN a farmer buys a tractor he not only wants service, but the best service he can get. To give the maximum service a tractor must be equipped with bearings which reduce friction to an absolute minimum.

Plain bearings heat up rapidly and bind when operating under heavy loads. They act as an invisible brake—drain the engine of its power and consume much oil.

An SKF Ball Bearing with its double row of balls allows the parts to turn with a minimum of friction. Its self-aligning feature relieves the bearing of all strains, even though the shaft is deflected or sprung. Imagine what would happen to both shaft and bearing if other types of bearings were put to the same test. The service and advantage gained by the use of SKF Ball Bearings are so tangible that the purchasing price of a tractor becomes a minor consideration.



SKF BALL BEARING CO.

HARTFORD CONN.

Light, Durable And Flexible


Note the Flexibility.


Does Not Pack the Ground.


Steers Itself When Plowing.


Does Belt Work, Too.

The Model D Bates Steel Mule is a light weight tractor which does the work cheaper than heavier machines of like rating do. And does it on account of its Crawler tread. The Bates Steel Mule is a high-grade tractor, powerful, sturdy, flexible and durable—everything that a farm tractor must be.

The Bates Steel Mule

Fully Covered by Patents

The Model D has a double crawler drive that grips the ground firmly under any and all conditions. There's no slip—no waste of power—but a strong, steady pull.

Has heavy duty, four-cylinder, valve-in-head motor. Pulls three plows at a speed of 2¼ to 3½ miles per hour. Burns kerosene, distillate or other low-grade fuel.

Nickel steel roller bearings are used throughout. Gears and all moving parts run in oil, enclosed against dust.

Does heavy belt work easily and economically. All in all, the Model D is the one light tractor that every farmer can use all the year 'round.

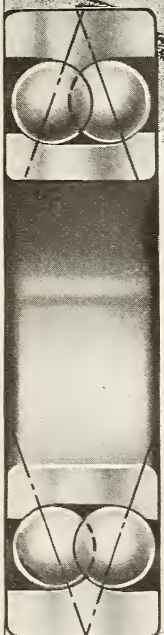
Reserve Your Territory Now

Twenty-four hours every day our modern ten-acre plant is turning out the Model D for dealers who are fortunate to have our contract. We advise live dealers to keep in touch with us, as we put on new agents as fast as we increase our production.

Joliet Oil Tractor Co.

103 Henderson Street **Joliet, Illinois**

FAFNIR



Dragon Bearing

THE real purpose of anti-friction bearings is to reduce friction, which is the source—directly or indirectly—of all bearing troubles. As the ball bearing is the most nearly frictionless type, isn't it the logical one to use?

Two types of Fafnir Ball Bearings are illustrated herewith. The new "Dragon" type is a double row ball bearing manufactured in standard single row widths, and is designed to carry both radial load and heavy thrust load **in either direction.** It is admirably adapted to carry the thrust of a worm or bevel gear.

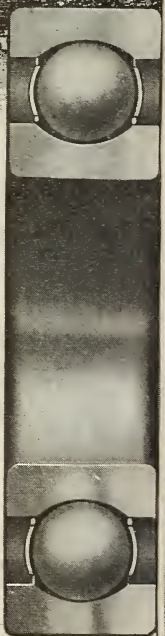
THE FAFNIR BEARING COMPANY

CONRAD PATENT LICENSEE

DETROIT Office: 752 David Whitney Bldg.

New Britain, Conn.

CHICAGO Office: 1301 S. Michigan Ave.



Radial Bearing

THE TRACTOR FIELD BOOK

PUBLISHED BY

FARM IMPLEMENT NEWS
THE TRACTOR AND TRUCK REVIEW

MASONIC TEMPLE

CHICAGO, U. S. A.

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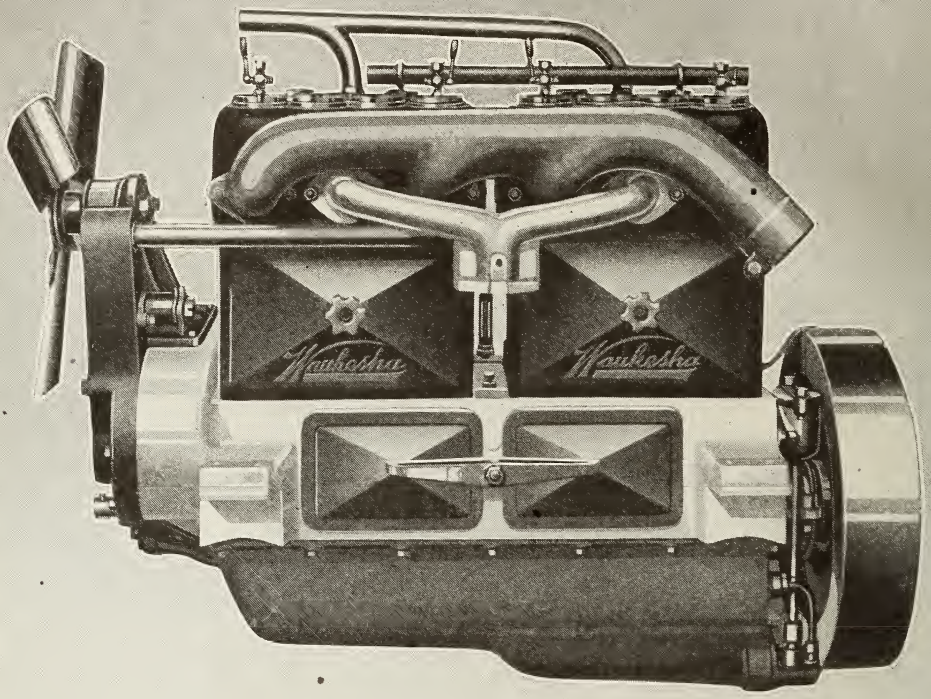


They who render the final verdict are not the ones who judge by sentiment or superficialities but are those guided by the inherent character of the product. That

Waukesha
TRADE MARK

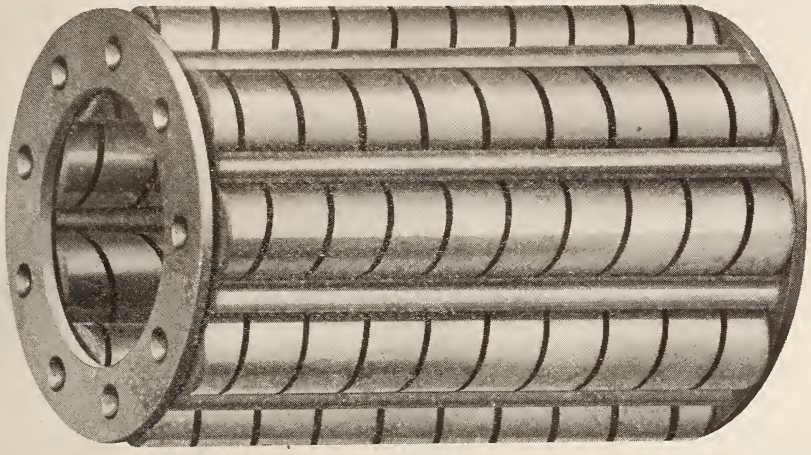
Four-Cylinder Motors for Trucks and Tractors

are possessed of exceptional character is evidenced by their dominance of the tractor field and their enthusiastic approval by truck authorities. Waukesha Motors have become an institution in national commercial life.

"Demand a Waukesha Motor in the Truck or Tractor YOU Buy"

WAUKESHA MOTOR CO., Waukesha, Wis.

World's Largest Manufacturers of Truck and Tractor Motors Exclusively



THE Hyatt Roller Bearing is a simple radial load bearing that is absolutely non-adjustable. It possesses a flexibility that enables it to withstand the severe shocks that must be constantly endured by the farm tractor—it possesses a superior capacity for lubricant that avoids the nuisance and delay of constant oiling.

The hollow spiral roller construction, found only in the Hyatt Bearing, obviates, more than does any other bearing, the ill effects from grit and dust.

These are a few fundamental reasons why Hyatt Bearings are used so extensively.

HYATT ROLLER BEARING CO.

Tractor Bearings Division

Motor Bearings Division, Detroit Chicago Industrial Bearings Division, New York

HYATT

TABULATED SPECIFICATIONS OF TRACTORS

No.	NAME AND ADDRESS OF MANUFACTURER	TRADE NAME AND RATING	*Drawbar Horse Power	*Belt Horse Power	Lbs. Pull Plowing Speed	No. Plows Recom.	Speed Forward M. P. H.
1	Acme Harvesting Machine Co., Peoria, Ill	Acme 12-24	12	24		3	2¼-3½
2	Advance-Rumely Thresher Co., La Porte, Ind	OilPull 12-20	12	20	2150	3	2.1-3¼
3	" " " " " "	OilPull 16-30	16	30	2850	4	2.1-3
4	" " " " " "	OilPull 20-40	20	40	3750	5-6	2-3.2
5	" " " " " "	OilPull 30-60	30	60	5900	8-10	1.9
6	Allis-Chalmers Mfg. Co., Milwaukee, Wis	Allis-Chalmers 6-12	6	12	1000	1	1.8-2½
7	" " " " " "	Allis-Chalmers 10-18	10	18	1650	2-3	2.3
8	" " " " " "	Allis-Chalmers 15-30	15	30	3300	3-4	2.3-2.8
9	American Tractor & Foundry Co., Charles City, Ia	American 15-30	15	30		3-4	2¼-3½
10	Appleton Mfg. Co., Batavia, Ill	Appleton 12-20	12	20	2200	2-3	2-3½
11	Aulson Tractor Co., Waukegan, Ill	Aulson	12	34	3000	3-4	2¼-4
12	Aultman & Taylor Machinery Co., Mansfield, Ohio	Aultman-Taylor	15	30		4	
13	" " " " " "	Aultman-Taylor	22	45		6	2.9
14	" " " " " "	Aultman-Taylor	30	60	8000	8-12	2.2
15	F. C. Austin Co., Chicago, Ill	Austin Tractor Cultivator	6	15	1000	1	2.4
16	" " " " " "	Austin 12-20 Multi-Pedal	12	20	2000	2-3	2½-3½
17	" " " " " "	Austin 75-125 Multi-Pedal	75	125	12500		1½-2¼-3½
18	Automotive Corp., Fort Wayne, Ind	Automotive	12	22½		2	2-5
19	Avery Company, Peoria, Ill	Avery 5-10	5	10		2 12"	1½-4¼
20	" " " "	Avery 5-10 Motor Cultivator	5	10			3
21	" " " "	Avery 8-16	8	16		2-3	1¾-3
22	" " " "	Avery 12-25	12	25		3-4	1¾-2¾
23	" " " "	Avery 14-28	14	28		3-4	2-3
24	" " " "	Avery 18-36	18	36		4-5	2-3
25	" " " "	Avery 25-50	25	50		5-6	2-3
26	" " " "	Avery 40-80	40	80		8-10	1¾-2¾
27	Bailor Plow Mfg. Co., Atchison, Kan	Bailor Motor Cultivator	12				
28	Bates Tractor Co., Lansing, Mich	Bates	15	25		3	1½-2½-6
29	Bean Spray Pump Co., San Jose, Cal	Bean Track Pull	6	10			2
30	Beeman Garden Tractor Co., Minneapolis, Minn	Beeman Garden Tractor	1¼	4	360	1 7"	1½-3½
31	Beltrail Tractor Co., St. Paul, Minn	Belt-Rail 12-20	12	20	2000	2-3	2¼-3½
32	C. L. Best Gas Traction Co., San Leandro, Cal	Best Tracklayer	21	40	3200	6	1¾-2½
33	" " " " " "	Best Tracklayer	38	78		9-12	1½-2⅜
34	Bethlehem Motors Corp., Allentown, Pa	Bethlehem 18-36	18	36	3100	4	1.8-3.3
35	Boring Tractor Corp, Rockford, Ill	Boring		20		2 16"	1½-4
36	Buckeye Mfg. Co., Anderson, Ind	Trundaar	20	30	4000	3	1½-2½
37	Bull Tractor Co., Minneapolis, Minn	Bull	12	24	2000	2-3	2⅔
38	Bullock Tractor Co., Chicago, Ill	Creeping Grip 15-25	15	25	3000	3-4	2½
39	Cameron Motors Corp., Stamford, Conn	Cameron				3-4	
40	J. I. Case Threshing Machine Co., Racine, Wis	Case 10-18			2000	2-3	2¼-3½
41	" " " " " "	Case 10-20			2650	3	2¼
42	" " " " " "	Case 15-27			3600	3-4	2¼-3½
43	" " " " " "	Case 20-40			4200	5-6	2-3
44	Champion Tractor Co., Argo, Ill	Champion 15-30	15	30	2750	3	1½-2½-4¼
45	Chase Motor Truck Co., Syracuse, N. Y	Chase 9-18	9	18		2-3	1½-2½
46	Cleveland Tractor Co., Cleveland, Ohio	Cleveland 12-20			1500	2	3½
47	C. O. D. Tractor Co., Minneapolis, Minn	C. O. D. 13-25	13	25	2600	3	2½
48	Coleman Tractor Co., Kansas City, Mo	Coleman 16-30	16	30		3	2.6-3
49	Comet Automobile Co, Decatur, Ill	Comet	15	30		3	3-5
50	Common Sense Gas Tractor Co., Minneapolis, Minn	Common Sense	20	40	3000	4	2½-3½
51	Craig Tractor Co., Cleveland, Ohio	Craig 15-25	15	25	3200	3	2¼-4
52	Dart Truck & Tractor Corp., Waterloo, Ia	Dart B ue J 15-30	15	30	3000	3	1¼-2½-6
53	Dauch Mfg. Co., Sandusky, Ohio	Sandusky 10-20	10	20	2000	2	2-3
54	" " " " " "	Sandusky 15-35	15	35	3000	4	2-3½-5
55	Dayton-Dick Co., Quincy, Ill	Leader 12-18	10	20	2000	2-3	2¼-3½
56	" " " " " "	Leader 18-36	16	32	4000	4-6	1.8-2½
57	Depue Bros. Mfg. Co., Clinton, Ia	Depue	20	30	6000	4	2½-3½-5
58	G. I. Dill Tractor Mfg. Co., Harrisburg, Ark	Dill	20			3	1½-4
59	C. H. A. Dissinger & Bro. Co., Wrightsville, Pa	Capital	16	20		3	
60	Eagle Mfg. Co., Appleton, Wis	Eagle 12-22	12	22	2600	3	2¼-3
61	" " " " "	Eagle 16-30	16	30	3800	4	2¼-3
62	Elderfields Reservation, Inc., Plandome, N. Y	Tractor-Cultivator	1	4	200	1 10"	1-3
63	Electric Wheel Co., Quincy, Ill	Allwork 14-28	14	28	3000	3	1¾-2.4
64	Elgin Tractor Corporation, Piqua, Ohio	New Elgin 12-25	12	25	2400	2-3	⅛-3½
65	Emerson-Brantingham Co., Rockford, Ill	E-B 9-16			1500	2	1½-2½
66	" " " " " "	E-B Model AA	12	20	2600	3	1.8-2½
67	" " " " " "	E-B 12-20			2000	3	1.7-2¼
68	" " " " " "	E-B 20-35			3300	5	1.7-2¼
69	" " " " " "	E-B (Reeves) 40-65	40	65	10000	8-10	2
70	Essex Tractor Co., Ltd., Essex, Ont	Essex	10	20		2	2½-3½
71	Evans Mfg. Co., Hudson, Ohio	Hudson	15	30	3500	3-4	2½-4
72	Fairbanks, Morse & Co., Chicago, Ill	Fair-Mor 10-20	10	20	1750	2	2¼
73	Farm Horse Traction Works, Hartford, S. D	Farm Horse		38		3-4	2½-3½
74	Fageol Motors Co., Oakland, Cal	Fageol 8-12	8	12	1250	2	2⅛
75	A. B. Farquhar Co., Ltd., York, Pa	Farquhar 15-25	15	25	2500	3-4	2¼-4
76	" " " " " "	Farquhar 18	18		3600	4-5	
77	" " " " " "	Farquhar 25	25		5000	6-7	
78	Henry Ford & Son, Dearborn, Mich	Ford-son 22		22	1800	2	1½-2¾-6¾
79	Four Drive Tractor Co., Big Rapids, Mich	Four Drive	15	26	2250	4	3
80	Frick Co., Waynesboro, Pa	Frick 12-25	12	24.7		3	2.3-3.8
81	Goold, Shapley & Muir Co., Ltd., Brantford, Ont	Beaver 12-24	12	24	2400	3	

*Supposed to be S. A. E. standard rating—80% of power developed on sustained test. Palpably some manufacturers do not follow the standard but give the actual power developed on drawbar and belt.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

No.	Size Thresher Recom.	No. Cylinders	Bore and Stroke	Normal R. P. M.	Traction	Wheel Ht. or Track Length	Width	Pulley Size	R. P. M.	Belt Speed	Fuel Recommended	Fuel Capacity	Shipping Weight	†Retail Price F.O.B. Factory
1—		4	Ver. 4½×6	850	2 W or 2 T	54 or 42	12 or 10	14×7	800	2925	G-K-D	3-20	W 6000 T	W T
2—	22	2	Hor. 6×8	560	2 W	51	12	19×7	560	2790	K-D	1-20	6940	
3—	28	2	Hor. 7×8½	530	2 W	56	18	23×8½	530	3190	K-D	1-34	10090	
4—	32	2	Hor. 8×10	450	2 W	64	20	26×9	450	3100	K-D	1-41	13900	
5—	36	2	Hor. 10×12	375	2 W	80	30	36×11	375	3540	K-D	3-70	26700	
6—		4	Ver. 3⅛×4½	800	2 W	48	6	10×5	1000	2600	Gas	10	1850	
7—		2	Hor. 5¼×7	720	2 W	60	12	14×6½	720	2600	G-K	5-20	4800	
8—		4	Ver. 4¾×6½	830	2 W	48	12	15×7½	660	2600	K-G	8-25	5300	
9—		4	Ver. 4¾×6	900	2 W	52	12	18×7	550	2585	K-D-G	8-25	5200	
10—	24	4	Ver. 4¼×5½	1000	2 W	54	12	12×7½	825	2600	G-K	25	5000	$1800
11—	26	4	Ver. 5×6½	850	2 W	48	8	16×7	562	2350	K-G	5-20	6000	2150
12—		4	Ver. 4¾×6¾	800	2 W	70	12	20×8	400	2100	G-K		7500	
13—		4	Hor. 5½×8	600	2 W	70	20	20×10	600	3140	G-K	10-35	11700	
14—	36	4	Hor. 7×9	500	2 W	90	24	24×11	500	3140	G-K	20-60	20200	
15—		4	Ver. 3⅛×4½	1000	2 W	37	4				Gas	12	800	
16—	20	4	Ver. 4×5	1000	2 T	50	8	8×6½	1000	2100	G-K	1½-12	3400	
17—		6	Ver. 7½×9	550	2 T	74	24	22×12	475	2730	G-K	5-75	28000	
18—		4	Ver. 3¾×5½	850	2 W	42	12	12×8	800	2510	G-K	4-18	2800	1450
19—		4	Ver. 3×4	1200	2 W	38	10	Special			G-K	11	2600	550
20—		4	Ver. 3×4	1200	2 W	42	5	9×9	1000	2350	G-K	9	3050	
21—	19	2	Hor. 5½×6	600	2 W	50	12	18×7	600	2820	K-G-D	2-12	4900	
22—	22	2	Hor. 6½×7	670	2 W	56	20	19½×7	570	2900	K-G-D	6¾-14	7500	
23—	22	4	Hor. 4⅞×7	650	2 W	60	12	16×7	700	2925	K-G-D	3¼-20	6800	
24—	28	4	Hor. 5½×6	650	2 W	65	20	18×8	650	3055	K-G-D	6-27	9250	
25—	32	4	Hor. 6½×7	500	2 W	69	20	22×8½	500	2875	K-G-D	6-27	12500	
26—	42	4	Hor. 7¾×8	500	2 W	87½	24	26×10	500	3400	K-G-D	6¾-44	22000	
27—		4	Ver. 3⅛×4½	1000	2 W	44	6				Gas	6	2000	
28—	18-24	4	Ver. 4½×5½	800	2 W	50	14	10×8	800	2080	Ker	2-15	4000	
29—		4	Ver. 3¼×4½	1250	1 T	32	12	12×5	625	1960	Dis		3200	
30—		1	Ver. 3½×4½	800	2 W	25	3½	4½×4	800	960	Gas	1¼	657	285
31—	28	4	Ver. 3¾×5½	950	1 T	48	21	10×6	950	2470	G-D	2-18	4500	
32—	36	4	Ver. 6¾×6¾	600	2 T						Dis	30	11560	4100
33—	42	4	Ver. 7¾×9	435	2 T						Dis	5-70	28000	5850
34—	28	4	Ver. 4¾×6	900	2 W	54	12	10×7½	1278	3320	Ker	4-14	6200	
35—	22	4	Ver. 4¼×5¾	1000	2 W	54	10		500		G-K	20	4000	1485
36—		4	Ver. 4¾×6¾	900	2 T	76	15	10×8	900	2300	D-G	30		
37—	26	2	Hor. 5½×7	750	1 W	72	14	12×6½	750	2350	G-K-D	3½-18½	4996	1075
38—	32	4	Ver. 4¾×6¾	900	2 T			12×8	600	1885	G-K-D	17½	7200	
39—		4	Ver. 4⅜×6	900	2 W	42	12	12×6			K-G		3000	950
40—	20	4	Ver. 3⅞×5	1050	2 W	42	9	14¼×5¼	1050	3900	K-D-G	2-10½	3400	1200
41—	20	4	Ver. 4¼×6	900	2 W	52	22-10	17×6½	900	4000	K-D-G	2¾-20	5080	
42—	26	4	Ver. 4½×6	900	2 W	52	12	16×6½	900	3760	K-D-G	2¾-20	5500	1600
43—	32	2	Hor. 8¾×9	475	2 W	66	20	24×8½	475	2980	K-D-G	11-26	13700	3000
44—	24	4	Ver. 4¼×5½	1000	2 W	48	12	12×6	850	2600	G-K	26½	3100	1465
45—		4	Ver. 3¾×5½	900	2 W	48	12	8×6	900	1890	G-D-K	2-11	4700	
46—	24	4	Ver. 3¾×5½	1200	2 T	50	6⅝	8×6	1200	2500	K-D-G	1-12	3175	1585
47—	24	2	Hor. 6½×7	550	2 W	70	12	18×8	550	2750	Ker	5-18	6500	1395
48—	24-28	4	Ver. 5×6½	750	2 W	46	10	14×7		2300 *	G-K	3-17	4925	1750
49—		4	Ver. 4×6	800	2 W	54	12	15¾×7½			Gas	20	4500	
50—	32	8-V	3¼×5	1100	1 W	62	24	22×8	400	2300	Gas	37	6000	2200
51—	26	4	Ver. 4¾×6	950	2 W	48	12	11×8	950	2735	Ker	3-24	5000	
52—	26	4	Ver. 4¼×5½	1050	2 W	40	12	12×7	750	2355	G-K	25	4500	1750
53—	24	4	Ver. 4¼×5¼	1000	2 W	48	12-18	10×8	1000	2600	K-D	5-15	4960	1500
54—	30	4	Ver. 5×6½	800	2 W	56	16-26	15×10	800	3120	K-D	5-25	9300	2500
55—	22	2	Hor. 6¼×6	800	2 W	48	12	14×7	800	2900	Ker	2-18	4800	1000
56—	28	4	Ver. 5×7½	700	2 T	50	15	14×8	750	2750	K-D	2-18	6500	2250
57—	32	4	Ver. 4½×6	800	4 W	40	10	12×6	800	2400	Ker	2-25	6500	2500
58—		4	Ver. 4½×5½	1000	2 W	42	36				Gas	18	5500	2480
59—	28	4	Ver. 4½×6½	600	2 W	60	16	12×8	600	1885	Ker	12-30	4500	1500
60—	28	2	Hor. 7×8	425	2 W	52	12	20×10	425	2225	Ker	5-18	5850	
61—	32	2	Hor. 8×8	425	2 W	52	12	24×10	425	2660	Ker	5-18	7000	
62—		1	Ver. 3½×5	1000	2 W	36	5	5×2	1000	1310	Gas	2½	750	425
63—	24	4	Ver. 5×6	800	2 W	48	12	12½×7	800	2500	Ker	5-25	5400	
64—	24	4	Ver. 4×6	900	2 W	42	10	9×8	900	2000	K-G-K	5-18	3400	1385
65—	18	4	Ver. 4⅛×4½	800	2 W	54	8	12×6	800	2500	Gas	20	4260	
66—	24-26	4	Ver. 4¾×5	900	2 W	54	12	12×6⅜	900	2825	Ker	4-20	4755	
67—	24	4	Ver. 4¾×5	850	2 W	60	12	14×9	708	2590	Ker	4-16	6155	
68—	28	4	Ver. 5×7	700	2 W	72	16	16¾×9	600	2670	Ker	5-35	10000	
69—	44	4	Ver. 7¼×9	500	2 W	90	24	22×10½	500	2880	Ker	8-63	22500	
70—	24	2	Hor. 5½×6½	750	2 W	42	10	11×6	750	2160	Ker	1-15	3200	950
71—	30	4	Ver. 4½×6	1000	2 W	60	12	24×8	412	2600	Gas	35	5800	1985
72		2	Hor. 6×7	600	2 W	48	10	18×6½	600	2820	K-G	10	3750	
73—	24-28	4	Ver. 5×6½	800	2 W	48	24	14×8	800	2925	Ker	5-18	4950	1485
74—		4	Ver. 3⅜×5	1200	2 W	48		8×6	1000	2100	G-D-K	10	3400	1500
75—	27	4	Ver. 4½×6	900	2 W	54	14	14×7	800	2925		5-25	6000	
76—		4	Ver. 6×8	550	2 W	84	20	32×9	275	2300		30-30	16000	
77—		4	Ver. 7×8	550	2 W	84	20	32×9	275	2300		30-30	19000	
78—		4	Ver. 4×5	1000	2 W	42	12	9×6	1000	2355	Ker	½-21	2500	
79—	28	4	Ver. 4½×6	950	4 W	42-36	12	14×8	710	2600	Ker	2-25	6000	2500
80—	22-26	4	Ver. 4×6	900	2 W	60	10	13×7	900	3060	Ker	3-20	5800	
81—	24	4	Ver. 4½×6¾	950	2 W	60	10	14×8	800	2600	G-K	7-14	5800	

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TABULATED SPECIFICATIONS OF TRACTORS

No.	NAME AND ADDRESS OF MANUFACTURER	TRADE NAME AND RATING	*Drawbar Horse Power	*Belt Horse Power	Lbs. Pull Plowing Speed	No. Plows Recom.	Speed Forward M. P. H.
82	Gray Tractor Co., Inc., Minneapolis, Minn	Gray 18-36	18	36	3600	4	2-2½
83	Great Western Tractor Corp., Omaha, Neb	Great Western	25	35	4000	4	3-5¼
84	Hackney Mfg. Co., St. Paul, Minn	Hackney Corn Tractor	12	20		2	2⅞
85	" " " " "	Hackney Auto Plow	20	40	2506	3 16"	3-4½
86	Hamilton Gear & Machine Co., Toronto, Ont	Hamilton 12-22	12	22		3	2⅓-2⅔
87	Hart-Parr Co., Charles City, Ia	New Hart-Parr		30		3	2-3
88	Joshua Hendy Iron Works, Sunnyvale, Cal	Invincible	6	15		2	2
89	Hession Tiller & Tractor Corp., Buffalo, N. Y	Wheat 12-24	12	24	3000	3	2½-3¾
90	Hicks Tractor Co., Milwaukee, Wis	Hicks 12-25			3000	3	2.4-4½
91	Hollis Tractor Co., Pittsburgh, Pa	Hollis 15-25	15	25	3000	3	1¾-2½-7
92	Holt Mfg. Co., Peoria, Ill	Caterpillar 5-Ton 4-Plow	25	45	3600	4	1⅓-2.6-4.9
93	" " " " "	Caterpillar 10-Ton 8-Plow	40	60	6000	8	1⅓-2½-3.9
94	" " " " "	Caterpillar 45	25	45	4500		1½-4
95	" " " " "	Caterpillar 75	50	75	7200		2-4
96	" " " " "	Caterpillar 120	70	120	12600		1½-4
97	Huber Mfg. Co., Marion, Ohio	Huber 12-25		25	2500	3	2⅓-3.8
98	Illinois Tractor Co., Bloomington, Ill	Illinois Super-Drive 18-36				4	2½-3¼
99	Imperial Machine Co., Minneapolis, Minn	Imperial 40-70	40	70	7400	10-12	2½
100	International Harvester Co., Chicago, Ill	International 8-16			1250	2	1.8-2½-4
101	" " " " "	Mogul 10-20			1800	3	2-2½
102	" " " " "	Titan 10-20			1800	3	1.8-2½
103	" " " " "	International 15-30			2350	4	1 8-2.4
104	" " " " "	I. H. C. Motor Cultivator	6	12		2 Row	2½
105	Joliet Oil Tractor Co., Joliet, Ill	Bates Steel Mule	16	25	3000	3-4	2.3-3½
106	J. T. Tractor Co., Cleveland, Ohio	J. T.	16	40	3200	3-4	1¼-2½-5
107	Kansas City Hay Press Co., Kansas City, Mo	Prairie Dog	9	18	1500	2	2.7-6
108	Kardell Tractor & Truck Co., St. Louis, Mo	Kardell Utility	8	16		2	1½-6
109	" " " " " " " "	Kardell Four in One	20	32	2500	3	2½-5½
110	Keck-Gonnerman Co., Mt. Vernon, Ind	Keck-Gonnerman 12-24	12	25	2300	3	2¼-3½
111	Kinnard & Sons Mfg. Co., Minneapolis, Minn	Flour City Junior 14-24				3	2.2-3¼
112	" " " " " " "	Flour City 20-35				4-6	2¼
113	" " " " " " "	Flour City 30-50				6-8	2¼
114	" " " " " " "	Flour City 40-70				8-10	2¼
115	Knickerbocker Motors, Inc., Poughkeepsie, N. Y	Knickerbocker		10	600	1	2½
116	Kohl Tractor Co., Cleveland, Ohio	Kohl 16-32	16	32		3-4	1¾-2¾
117	La Crosse Tractor Co., La Crosse, Wis	La Crosse Model F 12-24		27	2000	3	2½
118	" " " " "	La Crosse Model G 12-24		27	2000	3	2½
119	Homer Laughlin Engineers Corp., Los Angeles, Cal	Laughlin 10-20	10	20	2000	2	1¾-2-2¾
120	John Lauson Mfg. Co., New Holstein, Wis	Lauson Full Jewelled			2900	3-4	1¾-2½
121	Leader Tractor Mfg. Co., Des Moines, Ia	Rex 12-25			2400	3	2½-4
122	Leonard Tractor Co., Jackson, Mich	Leonard 4 Wheel Drive	20	30	4200	3-4	2-4
123	Little Giant Co., Mankato, Minn	Little Giant Model B	16	22	2200	3-4	1½-3-6
124	" " " " "	Little Giant Model A	26	35	3500	5-6	1½-3-6
125	Lombard Auto Tractor-Truck Corp., New York, N. Y	Lombard			15000	12	2-4-6
126	Macdonald Thresher Co., Ltd., Stratford, Ont	Macdonald 12-24	12	24		3	
127	Market Garden Tractor Co., Minneapolis, Minn	Market Garden Tractor					1-2½
128	Massey-Harris Co., Ltd., Toronto, Ont	Massey-Harris 12-25	12	25	3000	3	2⅜-4
129	Maxim Corp., New York, N. Y	Maxim	15	29.6	2800	2-3	1-1¾-2⅔
130	Medina Hoke Tractor Co., Medina, N. Y	Medina Hoke		24		2	
131	Midget Tractor Co., Minneapolis, Minn	Midget 8-12	8	12.5		1	2½-5
132	Midwest Engine Co., Indianapolis, Ind	Atlas 16-26	12.8	18.5	2800	3	2½
133	Minneapolis Steel & Machinery Co., Minneapolis, Minn	Twin City 12-20	12	20	2000	3	2.2-2.9
134	" " " " " " "	Twin City 16-30	16	30	3000	4	2-2¾
135	" " " " " " "	Twin City 25-45	25	45	4700	6	1.4-2
136	" " " " " " "	Twin City 40-65	40	65	7500	8	2
137	" " " " " " "	Twin City 60-90	60	90	11250	12	2
138	Minneapolis Threshing Machine Co., Hopkins, Minn	Minneapolis 15				3	2½-3
139	" " " " " " "	Minneapolis 20				4-5	2-2½
140	" " " " " " "	Minneapolis 40				6-10	2-2½
141	Moline Plow Co., Moline, Ill	Universal 9-18	9	18	2000	2	2.8
142	Monarch Tractor Co., Watertown, Wis	Lightfoot 10-6	6	10	1100	1-2	2-2½
143	" " " " "	Neverslip 20-12	12	20	2200	3	1¾ 2¼
144	" " " " "	Neverslip 30-18	18	30	3300	4	1¾-2¼
145	Muncie Wheel Co., Muncie, Ind	Muncie Square Turn 15-25	15	25		3	1⅔ 2½-3½
146	National Tractor Co., New York, N. Y	National 9-16	9	16	1800	2	
147	" " " " " "	National 14-27	14	27	2700	3	
148	Nelson Blower & Furnace Co., Boston, Mass	Nelson	20	28	5000	4	2.2-3-4½
149	Nilson Tractor Co., Minneapolis, Minn	Nilson Junior 16-25	12.8	24	3000	3-4	2½-5
150	" " " " "	Nilson Senior 24-36	19.2	32	4000	4-5	2¼-4½
151	Ohio General Tractor Co., Cleveland, Ohio	Ohio General	25	30	3250	3-4	2.2-3.1
152	Ohio Mfg. Co., Upper Sandusky, Ohio	Whitney 9-18	9	21	1600	2	1¾-2½-4
153	Oldsmar Tractor Co., Oldsmar, Fla	Oldsmar	2	5		1 10"	2½
154	Oliver Tractor Co., Knoxville, Tenn	Oliver 12-20	12	20		2-3	1¾-2⅓-3½
155	" " " " "	Oliver 15-30	15	30		3-4	1¾-2⅓
156	Parrett Tractor Co., Chicago, Ill	Parrett 12-25	12	25	2800	3	1¾-2⅜-4
157	Peoria Tractor Corp., Peoria, Ill	Peoria 12-25	12	25	3000	3	2.4-4
158	Pioneer Tractor Mfg. Co., Winona, Minn	Pioneer Special 15-30	15	30	3800	4	1¾-2½-4
159	" " " " " "	Pioneer 30	30	60	9000	10	1¾-2¼-4
160	Pope Mfg. Co., Watertown, S. D	Dakota	17	27			2¾
161	Porter Tractor Co., Des Moines, Ia	Porter		35			1¾-2½
162	Post Tractor Co., Cleveland, Ohio	Post	12	20	1500	2	1¾-3-5
163	Port Huron Engine & Thresher Co., Port Huron, Mich	Port Huron 12-25	11¾	23½	2200	3	1⅞-4

*Supposed to be S. A. E. standard rating—80% of power developed on sustained test. Palpably some manufacturers do not follow the standard but give the actual power developed on drawbar and belt.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

No.	Size Thresher Recom.	No. Cylinders	Bore and Stroke	Normal R.P.M.	Traction	Wheel Ht. or Track Length	Width	Pulley Size	R.P.M.	Belt Speed	Fuel Recommended	Fuel Capacity	Shipping Weight	†Retail Price F.O.B. Factory
82—	28	4	Ver. 4¾×6¾	850	Drum	54	54	11×8	850	2445	Gas	34	6544	2250
83—	28	4	Ver. 4¾×6	900	2 W	60	12				G-K-D	5–25	4800	1750
84—	24	4	Hor. 3¾×5	1000	2 W	48	8	16×8	1000	4180	G-K	3–20	3000	
85—	30	4	Ver. 4¾×7	750	2 W	60	14	32×8	250	2090	G-K	2–15	8000	
86—	22	4	Ver. 4×6	850	2 W	60	10	12½×7½	850	2600	Ker	3–17	5500	
87—	28	2	Hor. 6½×7	750	2 W	52	10	14×8	750	2750	K-D	23	5200	1395
88—		4	Ver. 3¾×5	900	2 W	42	12		900		Dis	15	5000	
89—	28	4	Ver. 4×6	1000	2 W	48	12	12×7		2600	Ker	3–15	4050	1695
90—		4	Ver. 4½×6	800	2 T	54	16	12×6½	725	2300	Ker	3–20		
91—	26	4	Ver. 3¼×4½	1650	2 W	30	9	12×6	800	2500	K-G	1–30	2900	1375
92—	32	4	Ver. 4¾×6	900	2 T	84	11			2700		35	9400	
93—	36	4	Ver. 6½×7	650	2 T	96	15			2700		46	18600	
94—		4	Ver. 6×7	600	2 T	80	13–30	14×9	625	2290	G-D	48½	13500	
95—		4	Ver. 7½×8	550	2 T	74	24–30	22×12	460	2650	G-D	74	23600	
96—	32	6	Ver. 7½×8	550	2 T	74	24–30	22×12	460	2650	G-D	74	24800	
97—	22	4	Ver. 4¼×5¾	900	2 W	60	10	13×7	900	3065	G-K	3–21⅓	6770	
98—	32	4	Ver. 5×6½	800	2 W	54	10	14×8½	600	2250	Ker	1½–18	5000	2250
99—	40	4	Hor. 7½×9	400	2 W	96	30	30×12	400	3140	G-K	18–70	20800	4500
100—		4	Ver. 4×5	1000	2 W	40	12	12¼×8½	650	2080	K-D-G	1–10	3300	975
101—	20	1	Hor. 8½×12	400	2 W	54	10	20×10½	400	2090	K-D-G	13	5500	1125
102—	20	2	Hor. 6½×8	500	2 W	54	10	20×8½	500	2615	K-D-G	16	5525	1225
103—	28	4	Hor. 5¼×8	575	2 W	66	14	18×9	575	2700	K-D-G	24	8700	2100
104—		4	Ver. 3½×4½	1000	2 W	36	8	8×8	1000	2100	Gas	5	3500	
105—	28	4	Ver. 4×6	900	2 T	50	10	12×8	735	2210	D-K-G	2–20		
106—	30	4	Ver. 4¾×6	1000	2 T	74	9	10×8	1000	2600	Ker	2–25	6000	2500
107—	28	4	Ver. 3¾×5¼	950	1 W	48	20	10×6½	950	2490	Gas	12	3400	1150
108—		4	Ver. 3¾×4¼	1000	2 W	48	12	9×6	1000	2350	K-G		2300	985
109—		4	Ver. 4½×5¾	900	2 W	60	12	18×4	335	1500	Gas	2–16	5100	2250
110—	24	2	Hor. 6½×8	650	2 W	61	12	12×8	650	2700	Ker	3–23	6500	1500
111—	24	4	Ver. 5×5	800	2 W	60	12–14	26×7½	320	2175	Ker	22		
112—	28–30	4	Ver. 5¼×6	800	2 W	72	18	28×8	350	2565	Ker			
113—	32–34	4	Ver. 6¼×7	600	2 W	84	24	32×9	275	2300	Ker			
114—	36	4	Ver. 7½×9	500	2 W	96	24	34×10	275	2445	Ker			
115—		4	Ver. 3⅛×4½	1000	2 W			7×5½	800	1465	Gas	10	1450	595
116—	32	4	Ver. 4¾×6	900	2 W	48	12	11×8	900	2600	Ker	5–15	4500	2200
117—	24	2	Hor. 6×7	750	2 W	56	10	11×7½	750	2100	Ker	2–13	4000	1150
118—	24	2	Hor. 6×7	750	2 W	56	10	11×7½	750	2100	Ker	2–13	4000	1250
119—		4	Ver. 4¾×5½	700	2 T	54	10	12×6	700	2200	Dis	25	6000	2750
120—	30	4	Ver. 4½×6	950	2 W	54	12	18×8	475	2300	K-G	13½	6500	1985
121—	20–24	4	Ver. 4¼×5¾	900	2 W	60	10	12×7	900	2825	Ker	5–20	5800	1800
122—	28	4	Ver. 4½×6	1000	4 W	50–30	12–9	16×8	575	2400	G-K	5–20	5000	2000
123—	24	4	Ver. 4½×6	900	2 W	54	14	9×7	900	2120	Ker	5–25	5200	1950
124—	32	4	Ver. 5½×6	750	2 W	66	20	13×9	750	2550	Ker	5–35	8700	2900
125—		6	Ver. 5½×6¾	1200	2 T	120	12				Gas	1–65		
126—	24–28	4	Ver. 4¾×6	750	2 W	58	10	14×8	650	2380	G-K	7–15	6500	1650
127—		1	Ver. 4×4		2 W	24	4							295
128—	24	4	Ver. 4¼×5½	1000	2 W	60	10	12×7	1000	3140	K-G	3–18	5200	1560
129—	24	4	Ver. 4¼×5½	900	2 W	40	10	8×8		2100	G-K	1–18	4000	1685
130—	24	4	Ver. 4¼×5¾	900	2 W	61		10×7	900	2340	G-K		3800	1600
131—		4	Ver. 3⅛×4½	1000	2 W	36–48	6	10×4	1000	2600	Gas	5	1500	735
132—	24	4	Ver. 4¼×5¾	1000	2 W	66	12	10×8	875	2300	Ker	5–20	5500	1750
133—	20	4	Ver. 4¼×6	1000	2 W	50	12	16×6	650	2715	G-K	3–23	4500	
134—	24	4	Ver. 5×7½	650	2 W	54	14	17×8	528	2350	G-K	3–33	8500	
135—	32	4	Ver. 6¼×8	600	2 W	76	20	20×8½	600	3150	G-K	10–51	17000	
136—	40	4	Ver. 7¼×9	500	2 W	84	24	23×10½	500	3000	G K	10–95	25000	
137—	40	6	Ver. 7¼×9	500	2 W	84	30	23×10½	500	3000	G-K	10–95		
138—	24	4	Ver. 4½×7	750	2 W	56	12	15×6½	750	3000	Ker	3–18½	6600	
139—	28	4	Hor. 5¾×7	700	2 W	62	20	20×10	700	3660	Ker	5–30	12000	
140—	40	4	Hor. 7¼×9	500	2 W	85	30	24×10½	500	3130	Ker	5–80	22500	
141—	20	4	Ver. 3½×5	1000	2 W	52	8	9×6½			Gas	15	3280	
142—		4	Ver. 4×4	900	2 T	38	6–8	9×7			Ker	1–9	3200	1200
143—	28	4	Ver. 4×6	850	2 T	50	12	18×8	500	2350	Ker	2–23	6200	2050
144—	32	4	Ver. 4¾×6	800	2 T	66	12	18×8	475	2230	Ker	2–23	7400	2350
145—	24	4	Ver. 4½×6	900	2 W	54	12	12×7	900	2825	G-K	4–16	5000	
146—		4	Ver. 3½×5¼	1200	2 W	46	10	10×6			K-G-D	10–20	3800	1075
147—	22–26	4	Ver. 4½×5¾	1200	2 W	46	10	10×6			K-D	10–30	4200	1375
148—		4	Ver. 4¾×5½	900	4 W	50		26×7	300	2000	Gas	27		
149—	24	4	Ver. 4¼×5¾	900	3 W	50	16–7	20×6	360	1900	G-K	2–21	5000	1775
150—	28–30	4	Ver. 4¾×6¾	800	3 W	52	20–10	24×8	320	2010	G-K	3–28	6400	2475
151—	28	4	Ver. 4¼×5½	1000	2 T	48	8	8×6	850	1785	G-K	8–8	3500	1800
152—		2	Hor. 5½×6½	750	2 W	48	10	11×6¾	750	2160	Gas	9	3000	1175
153—		1	Hor. 5×5	550	2 W	32	8	5×3¾	550	700	Gas	2	900	300
154—		4	Ver. 4¼×5½	900	2 T	36	11	15×6½	633	2485	Gas	5–15	5500	
155—		4	Ver. 4½×6	900	2 T	60	11	18×6½	450	2120	Gas	5–15	6500	
156—	28	4	Ver. 4¼×5½	1000	2 W	60	10	12×8	1000	3140	Ker	3–18	5225	
157—	26	4	Ver. 5×6½	800	2 W	56	12	14×7	650	2450	Ker	6–22	5200	1985
158—	26	4	Hor. 5½×6	750	2 W	60	18	14×7	750	2745	Ker	2–32	8500	
159—	40	4	Hor. 7×8	625	2 W	96	24	18×15	625	2940	G-K	10–90	23000	
160—		4	Ver. 4¾×6	750	1 W	42	60	14×7	750	2745	Ker		5200	1750
161—		4	Ver. 4¼×5¾		2 W	60	10	8			G-K	25		
162—		4	Ver. 3¾×4¼	1200	2 W	28	14	9×6½	1000	2825	Gas	10	3300	1250
163—	22	4	Ver. 4×6	900	2 W	56	10	14×8			Ker	5–25	6000	

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No.	NAME AND ADDRESS OF MANUFACTURER	TRADE NAME AND RATING	*Drawbar Horse Power	*Belt Horse Power	Lbs. Pull Plowing Speed	No. Plows Recom.	Speed Forward M. P. H.
164	Powell Tractor Co., Elwood, Ind	Powell 16-36	16	34	3000	3-4	2½-5
165	Power Truck & Tractor Co., Detroit, Mich	Power	15	32.4	2500	3	1½-3
166	Pullet Tractor Co., Minneapolis, Minn	Pullet		40		4	
167	R & P Tractor Co., Alma, Mich	R & P 12-20	12	20	2200	2-3	1⅓-2⅓-4½
168	Redden Truck & Tractor Co., Harvey, Ill	Farmer Tractor-Truck 12-25	12	25	2000	3	2⅓
169	Reed Foundry & Machine Co., Kalamazoo, Mich	Reed 10-20	10	20	2000	2	2½-3½
170	" " " " " " "	Reed 15-27	15	27	3000	3	2½-3½
171	Rock Island Plow Co., Rock Island, Ill	Heider 9-16	9	16	1700	2	1-4
172	" " " " " " "	Heider 12-20	12	20	2400	3	1-4
173	Ross Motors, Ltd., Chicago, Ill	Ross Utility 15-25			3000	3	1¾-4
174	Royer Tractor Co., Wichita, Kan	Royer 12-25	12	25		3	1-3
175	The Russell & Co., Massillon, Ohio	Russell Jr. 12-24	12	24	2000	2	2-2.4
176	" " " " "	Russell Little Boss 15-30	15	30	3000	2-3	2-2.4
177	" " " " "	Russell Big Boss 20-40	20	40	4000	4-5	2-2.4
178	" " " " "	Russell Giant 40-80	40	80	8000	8-10	2-3¼
179	Samson Sieve-Grip Tractor Co., Stockton, Cal	Samson Sieve-Grip	12	28.3	1800	3	1¾-3½
180	Samson Tractor Co., Janesville, Wis	Samson Model M				2-3	
181	Scientific Farming Machinery Co., Minneapolis, Minn	Princess Pat 10-18	10	18	1500	1	2½-4½
182	Shelby Tractor & Truck Co., Shelby, Ohio	Shelby 9-18	9	18		2	1¾-2½-5
183	Short Turn Tractor Co., Bemidji, Minn	Short Turn 20-30		30		3	2½
184	Southern Motor Mfg. Assn., Ltd., Houston, Tex	Ranger	6	12	1600	2 12"	
185	Square Turn Tractor Co., Norfolk, Neb	Square Turn	18	38	3800	3	2¼
186	Star Tractor Co., Findlay, Ohio	Indiana	5	10	1100	1 16"	1-4½
187	Stinson Tractor Co., Superior, Wis	Stinson 18-36	18	36		3-4	2-3½
188	Stone Tractor Mfg. Co., Texarkana, Tex	Stone 24-40	24	40	4000	4	1¾-2¾
189	Strite Tractor Co., New York, N. Y	Strite 18-30	18	30	3500	4	2¼-4¼
190	Sun Tractor Co., Columbus, Ohio	Sun 8-16	8	16		2	2½-5
191	S. W. H. Engineering Co., Cleveland, Ohio	S-W-H 15-30	15	30	3000	3-4	2⅓-3½
192	Texas Truck & Tractor Co., Dallas, Tex	Wharton	20	40		4-6	2¾
193	Townsend Mfg. Co., Janesville, Wis	Townsend 12-25	12	25	3000	2-4	2½
194	Traction Engine Co., Boyne City, Mich	Heinze 30-40		40	4000	3-4	1½-3-4½
195	Traction Motor Corp., Kalamazoo, Mich	Traction Motor				4	
196	Trenam Tractor Co., Stevens Point, Wis	Trenam 12-24	12	24		3	2½-3½
197	Turner Mfg. Co., Port Washington, Wis	Turner Simplicity 14-25	15.7	24½	2600	3	1¾-2½
198	U. S. Tractor & Machinery Co., Menasha, Wis	Uncle Sam 20-30	15	25	2500	3	2½
199	United Tractors Co., Inc., New York, N. Y	Cultitractor	8	15	1000	1	1½-3
200	Velie Motors Corp., Moline, Ill	Velie Biltwel 12-24	12	24		3	2-2.9-6½
201	Victor Tractor Co., Minneapolis, Minn	Victor		34	4500	4	2⅝-4½
202	Victory Tractor Co., Greensburg, Ind	Victory 9-18	11	19	2000	2	2-4½
203	Wallis Tractor Co., Racine, Wis	Wallis	13½	25	2000	3	2½-3½
204	Waterloo Gasoline Engine Co., Waterloo, Ia	Waterloo Boy 12-25	12	25	2400	3	2½-3
205	H. A. Wetmore, Sioux City, Ia	Wetmore 12-25	12	24.8		2	1.9-2¾-4¾
206	Wichita Tractor Co., Wichita, Kan	Wichita	8	16	1500	2-3	2¼
207	Wilson Tractor Co., Peoria, Ill	Wilson Motor Cultivator	6	12		2 Rows	1-3¾
208	Wisconsin Farm Tractor Co., Sauk City, Wis	Wisconsin 16-32	16	32	3500	3-4	2⅓-3½
209	Wolverine Tractor Co., Saginaw, Mich	Wolverine 41		41		4	2½
210	World Harvester Corporation, New York, N. Y	Auto-Tiller		10	850	1 12"	2½
211	Yankee Boy Tractor Corp., Chicago, Ill	Yankee Boy 16-32	22	40	3500	3-4	2⅓-3½
212	Yuba Mfg. Co., Marysville, Cal	Yuba Ball Tread 12-20	12	20	3400		1½-2-4
213	" " " " "	Yuba Ball Tread 20-35	20	35	5000		2-3¼
214	Zelle Tractor Co., St. Louis, Mo	Zelle 12-25	12	25	2000	3	1¼-5

*Supposed to be S. A. E. standard rating—80% of power developed on sustained test. Palpably some manufacturers do not follow the standard but give the actual power developed on drawbar and belt.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

No.	Size Thresher Recom.	No. Cylinders	Bore and Stroke	Normal R. P. M.	Traction	Wheel Ht. or Track Length	Width	Pulley Size	R. P. M.	Belt Speed	Fuel Recommended	Fuel Capacity	Shipping Weight	†Retail Price F. O. B. Factory
164—	30	4	Ver 5×6½	750	2 W	48	12	14×7	750	2750	G-K	2½–25	4500	1785
165—	20-24	1	Hor 9×12	500	2 W	60	16–10	20×10	500	2520	Ker	15	4200	1485
166—		4	Ver 4¾×6		2 W	64	12				Ker			
167—		4	Ver 3¾×5¼	1000	2 W	40	11	8×7½	850	1750	Gas	19	3600	
168—	26	4	Ver 4¼×5½	900	2 W	54	10	16×12	450	1880	Gas	20	4400	2600
169—	22	4	Ver 4×5¾	1100	2 W	60	12	12×6	875	2750	K-G	10–20	4750	1340
170—	26	4	Ver 4¼×5¾	1000	2 W	60	12	12×6	875	2750	K-G	10–20	5000	1665
171—	18	4	Ver 4¼×5¾	800	2 W	54	8	12×6	700	2200	K-G	7–14	4000	1070
172—	24	4	Ver 4½×6¾	750	2 W	57	10	14×7	600	2200	K-G	7–14	6000	1395
173—	24	4	Ver 4¼×6	900	2 W	60	12	12×7	900	2825	K-D	5–20	4250	985
174—		4	Ver 4×6	900	2 W	54	14	18×8	700	3290	Ker	3–20	5000	1650
175—	24	4	Ver 4½×5¾	1000	2 W	53	10	12½×7	900	2950	K-G	3–20	6200	
176—	27	4	Ver 4½×6¾	950	2 W	53	10	12½×7	870	2850	K-G	3–20	6900	
177—	30	4	Ver 5½×7	825	2 W	60	16	12½×8	840	2755	K-G	5–30	7600	
178—	36	4	Ver 8×10	525	2 W	84	22	24×10	525	3300	K-G	22–88	24000	
179—	30	4	Ver 4¼×6¾	650	2 W	41	18		750		Dis	18	5800	1750
180—		4	Ver		2 W									650
181—	22	4	Ver 3½×5¼	1050	2 W	40	8	12×6	890	2800	Gas	12	1900	1185
182—	24	4	Ver 3¾×5¼	1100	2 W	42	12	10×6½	950	2500	G-K	5–12	3750	
183—	20	4	Ver 4×6	900	1 W	51	24		900		G-K	5–15		1350
184—		4	Ver 3⅛×4½	1000	4 W	30	4½	8×6	350	735	Gas	10	2200	750
185—	30	4	Ver 5×6½	850	2 W	60	12	12×8	850	2670	Ker	4–30	7300	1875
186—		4	Ver 3⅛×4½	1000	2 W	50	12	7×6	1000	1830	Gas	13	1700	
187—		4	Ver 4¾×6	1000	2 W	60	12	12×8½	1000	3140	Ker	3–22	6350	
188—	28	4	Ver 4½×6	1000	2 W	48	14	12×7	1000	3140	Ker	2–18	5000	1425
189—	32	4	Ver 5×6½	800	2 W	54	10	16½×8	600	2580	G-K	5–24	5300	2250
190—		4	Ver 3¼×5	1200	2 W	54	8	8×8	1200	2520	Gas	12	3000	1250
191—	28-30	4	Ver 4¾×6	900	2 W	48	12	18×6½	550	2600	G-K	3–25	4800	
192—	32	4	Ver 5×6½	900	4 W				900		Ker	3–20	3400	1485
193—	24-28	2	Hor 7×8	500	2 W	56	18	20×8	500	2615	Ker	18	6000	
194—		4	Ver 4¼×6	1200	4 W	46	12	8×8	1200	2520	K-G	2–20	4000	
195—	32	8-V	3¼×5	1600	2 W	48	24	10½×8½			Gas	10–20	6000	
196—		4	Ver 4¾×6	900	2 W	60	10	20×7½	405	2120	K-G		4500	
197—	28	4	Ver 4¼×5½	1000	2 W	54	12	14×7½	600	2200	Ker	5–15	4500	1675
198—	28	4	Ver 4¾×6	900	2 W	50	12	11×8	900	2600	Ker	3–22	5500	2300
199—	18	4	Ver 3¼×4½	1200	2 W	40	8	8×4	600	1260	G-K	1–6	2200	
200—		4	Ver 4⅛×5½	1100	2 W	52	10	13×7½	900	3060	Ker		4500	
201—		4	Ver 5×6½	900	2 W	62½	24	10×8	900	2340	Ker	5–30	4300	1685
202—	20	4	Ver 3½×5	1175	2 W	48	12	9×6	1175	2600	Gas	25		1085
203—	24-26	4	Ver 4¼×5¾	900	2 W	48	12	18×6	430	2020	Gas	20	3525	
204—	24	2	Hor 6½×7	750	2 W	52	12	14×8	750	2750	Ker	1–20	6000	
205—	20-24	4	Ver 4⅛×5½	960	2 W	46	10	12×7	750	2370	Gas	12	2900	1385
206—		2	Hor 5½×6	750	2 W	56	10	12×6	750	2360	Gas	9	3500	1170
207—		4	Ver 3⅛×4½	950	2 W	44	6	6½×5	950	1600	Gas	10	2800	
208—	28	4	Ver 5×6½	800	2 W	52	12	16×8	575	2400	Ker	6–11	5400	2250
209—		4	Ver 4¾×6½	900	1 T-2 W	T 60	18	14×8	900	3295	Ker			
210—		1	Ver 5×7	800	2 W	36	5				K-G		950	
211—	32	4	Ver 5×6½	800	2 W	54	12	16×8		2100	Ker	5–20	5400	2295
212—		4	Ver 4½×6¾	700	2 T	36	13	12×6¾	700	2195	Dis	¼–27	6750	
213—		4	Ver 5¼×7	700	2 T	40	18		700		Dis	8–30	10250	
214—	24	4	Ver 4¼×5½	900	2 W	54	12	12×7	600	2000	Ker	5–25	4000	

† Prices given are those in effect Jan. 1, 1919, and are subject to change without notice. Variations due to differences of equipment for different sections should be considered.

How sales are tripled by the Tractor that has a record of

11 YEARS' ACTUAL FIELD WORK

Model C 12-20

The success of Rock Island dealers is reflected by Rathbun Bros. Co. of Milan, Ill. Walt E. Rathbun says: "We sold 14 tractors the first year; the second year we doubled our sales; and before the present year ends (Aug. 1, 1918) we will have delivered an additional 40 machines."

Heider

Special transmission, one of the greatest successes ever built into a tractor. Seven speeds, forward or reverse, with one lever. **Burns Kerosene or Gasoline** without carburetor change. Heavy duty 4-cyl. Waukesha engine. Two sizes meet every farm need.

Write for proposition.

Rock Island Plow Company

Established 1855 — Rock Island, Ill.

Branches:

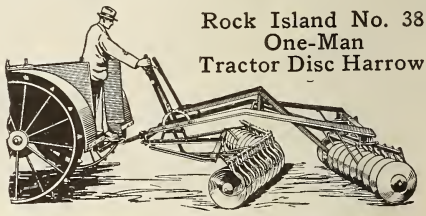
MINNEAPOLIS, MINN. OMAHA, NEB.
INDIANAPOLIS, IND. KANSAS CITY, MO.
SIOUX FALLS, S. DAK. DALLAS, TEX.
OKLAHOMA CITY, OKLA.

R. M. WADE & CO., Portland, Ore., and Spokane, Wash., and E. P. BOSBYSHELL CO., Los Angeles, Calif., Pacific Coast Distributors.

Rock Island Tractor Plow

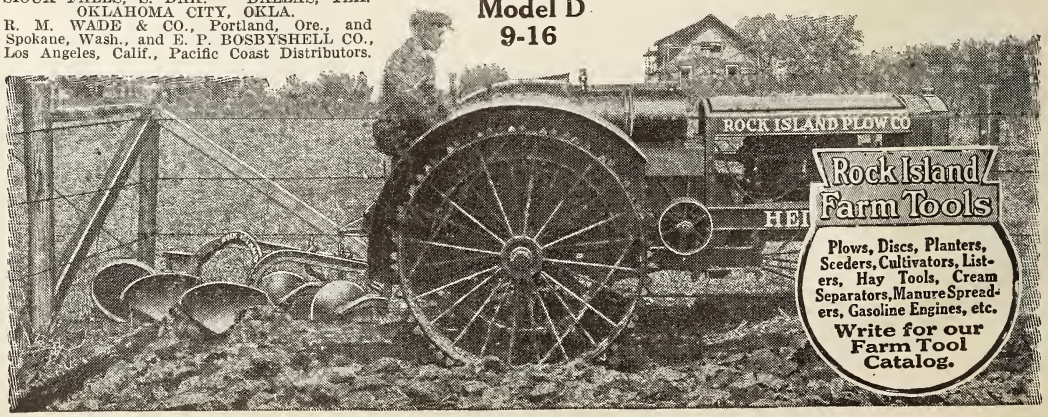
Does best work behind **any** tractor, 2, 3 or 4 CTX bottoms. Front furrow wheel lift. Extra high clearance. Tractor sales mean Rock Island tractor plow sales. Ask about complete line.

Rock Island No. 38 One-Man Tractor Disc Harrow



Close-up position permits one man easily to operate tractor and harrow without stopping or leaving tractor. Extremely flexible. Light draft. Tractor sales mean Rock Island tractor harrow sales. Ask about complete line.

Model D 9-16



Rock Island Farm Tools

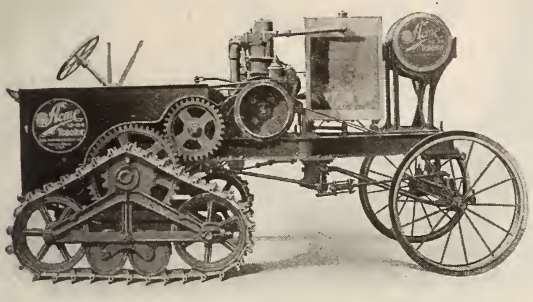
Plows, Discs, Planters, Seeders, Cultivators, Listers, Hay Tools, Cream Separators, Manure Spreaders, Gasoline Engines, etc.

Write for our Farm Tool Catalog.

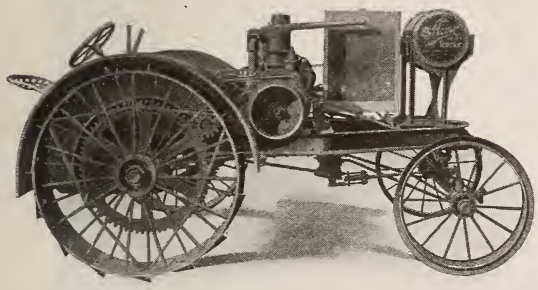
ILLUSTRATED TRACTOR DIRECTORY

ACME HARVESTING MACHINE CO., PEORIA, ILL.

ACME 12-24.



A 3-plow tractor with 2 drive wheels and 2 drive tracks interchangeable; 2 steering wheels; 12 h. p. on drawbar, 24 h. p. on belt; 3,200 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3⅛ m. p. h.; operating weight, with wheels, 6,000 lbs.; with tracks, 6,700 lbs. Motor: Beaver, valve in head, 4 cylinders vertical, 4½x6 in., 850 r. p. m.; recommended fuel, gasoline, kerosene or distillate. Lubrication: Force feed. Bearings: Front wheels, plain; rear axle, rollers; transmission, Timken rollers on high speed shafts; jackshaft, Hyatt rollers. Transmission: Enclosed gears, 2 speeds forward. Final drive: Spur gears and spur pinions. Rear axle diameter 2½ in. Drive wheels: 54 in. high, 12 in. wide.



Tracks: 42 in. on ground, 10 in. wide. Pulley: 14x7 in., 800 r. p. m., driven from crankshaft; belt speed 2,925 ft. per min. 2 fuel tanks, gasoline 3 gals., kerosene 20 gals. Donaldson air cleaner. Ignition: K-W high tension magneto. Governor: Pierce. Carburetor: Stromberg 1½ in., exhaust heated manifold. Cooling: Water; Eureka radiator, pump circulation. Hitch: 22 in. high, 36 in. lateral adjustment. Dimensions: Length over all with canopy 144 in., width 76 in., height with canopy 102 in., without 76 in.; shipping weight, wheel type, 6,000 lbs., crawler type, 6,700 lbs. Branch houses in 24 cities.

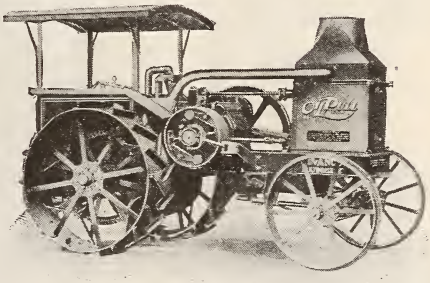
ADVANCE-RUMELY THRESHER CO., LA PORTE, IND.

OILPULL 12-20.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; recommended for 22-in. thresher; 2,150 lbs. pull at plowing speed; 2 speeds forward, 2.1 and 3.26 m. p. h.; diameter turning circle, 14 ft. Motor: Own, 2 cylinders twin horizontal, valve in head, 6x8 in., 560 r. p. m.; recommended for kerosene or distillate. Lubrication: Madison-Kipp force feed oiler and splash; heavy oil recommended. Bearings: Plain in wheels; 2 Hyatt rollers in rear axle; 6 Hyatts and 2 bronze in transmission. Transmission: Enclosed spur gears, own make, finished. Final drive: Open bull gears and pinions. Drive wheels, 51 in. high, 12 in. wide. Pulley: 19x7 in., 560 r. p. m.; controlled through motor clutch; mounted on crankshaft; belt speed, 2,790 ft. per min. 3 fuel tanks, gasoline 1 gal., kerosene 20 gals., water 11 gals. Donaldson dry air cleaner. Bosch magneto with impulse starter. Own governor, Secor-Higgins 2¼-in. carburetor. Cooling: Own radiator, pump circulation; cooling medium, oil; no fan. Spark plugs, ⅞ in., S. A. E. 5 rings to pistons, 6x5-16 in. Lateral adjustment of hitch 24 in., vertical 1¾ in. Tractor dimensions: Length 132 in., width 64 in., height 75 in.; shipping weight 6,940 lbs. Branches: Aberdeen, S. D., Columbus, O., Des Moines, Ia., Kansas City, Mo., Minneapolis, Minn., San Francisco, Cal., Battle Creek, Mich., Crowley, La., Fargo, N. D., Lincoln, Neb., Peoria, Ill., Spokane, Wash., Billings, Mont., Dallas, Tex., Indianapolis, Ind., Madison, Wis., Portland, Ore., Wichita, Kan., Calgary, Alta., Regina, Sask., Winnipeg, Man., Saskatoon, Sask.

ADVANCE-RUMELY THRESHER CO., LA PORTE, IND.

OILPULL 16-30.



A 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 30 h. p. on belt; recommended for 28-in. thresher; 2,850 lbs. pull at plowing speed; 2 speeds forward, 2.1 and 3 m. p. h.; diameter turning circle 17 ft. Motor: Own, 2 cylinders twin horizontal, valve in head, 7x8½ in., 530 r. p. m.; recommended for kerosene or distillate. Lubrication: Madison-Kipp mechanical oiler and splash; heavy oil recommended. Bearings: Plain in wheels; 2 Hyatt rollers in rear axle; 4 Hyatts and 2 babbitt in transmission. Transmission: Enclosed spur gears, own make, finished. Final drive: Bull gears and pinions, open. Drive wheels 56 in. high, 18 in. wide. Pulley: 23x8½ in., 530 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 3,190 ft. per min. 3 fuel tanks, gasoline 1 gal., kerosene 34 gals., water 21¼ gals. Donaldson dry air cleaner. Bosch magneto with impulse starter. Own governor. Secor-Higgins 2½-in. carburetor. Cooling: Own radiator, pump circulation; cooling medium, oil; no fan. Spark plugs ⅞ in. S. A. E. 5 rings to pistons, 7x⅜ in. Lateral adjustment of hitch

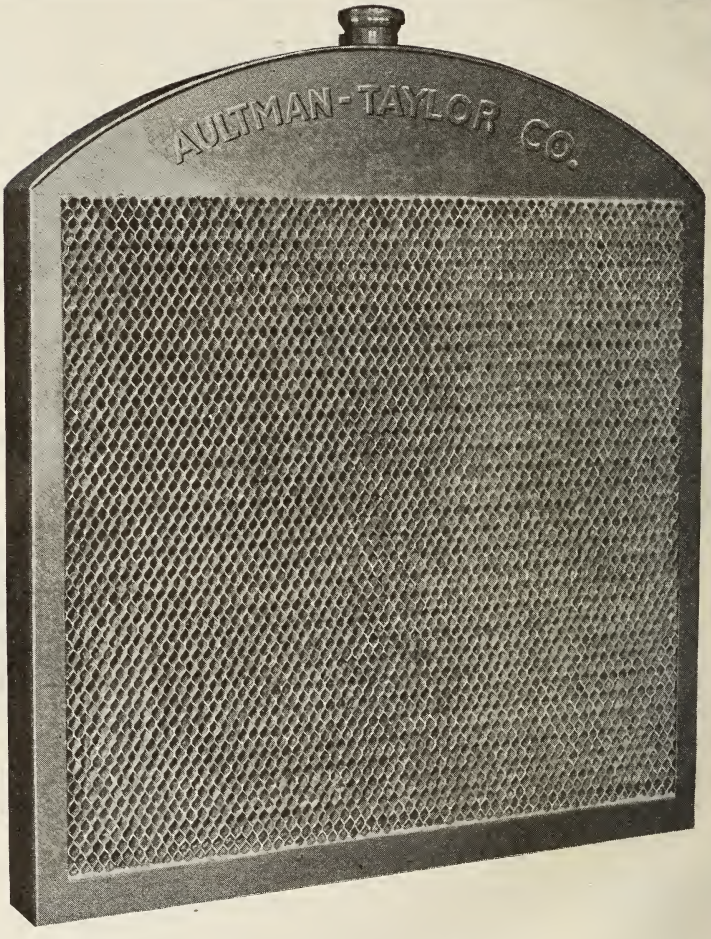
HOOVEN
EFFICIENCY RADIATORS

NEW DESIGN
TUBULAR CONSTRUCTION

Distinctive Advantages

Especially Adapted for Tractors—Trucks

The HOOVEN RADIATOR shows a marked advance in radiator construction along entirely new ideas overcoming the drawbacks of present types—both honeycomb and tubular—at the same time incorporating the merits and advantages of each. The construction is unique; a big departure and a distinct advance over conventional types.



A FEW USERS

TOWER TRUCK CO.
INTERNATIONAL HARVESTER CO.
SOUTH BEND MOTOR CO.
LANE TRUCK CO.
MASTER TRUCKS.
RELIANCE MOTOR TRUCKS
DEARBORN TRUCK CO.

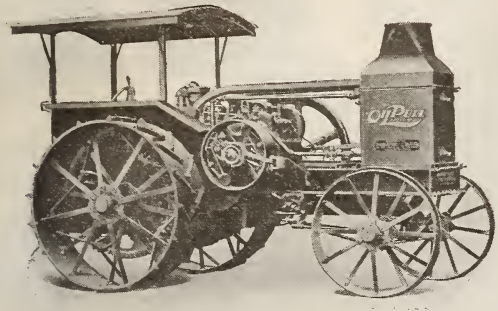
STANDARD EQUIPMENT

TREMENDOUS WATER CAPACITY
KEEPS COOL
NO CLOGGING NO FREEZING
EXCLUSIVE DESIGN
HIGHEST EFFICIENCY
NEVER YET BEATEN OR EQUALED
IN EVAPORATION TESTS

HOOVEN RADIATOR COMPANY
517 West Monroe Street
CHICAGO, U. S. A.

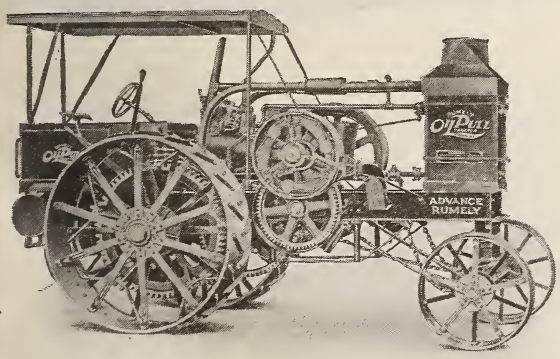
24 in., vertical 3½ in. Tractor dimensions: Length 155 in., width 80¼ in., height 99 in.; shipping weight 10,090 lbs.

ADVANCE-RUMELY THRESHER CO., LA PORTE, IND.
OILPULL 20-40.



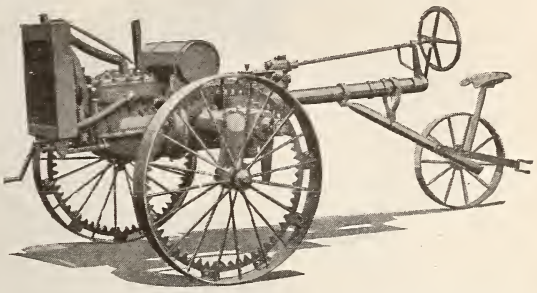
A 5 to 6-plow tractor with 2 drive wheels and 2 steering wheels; 20 h. p. on drawbar, 40 h. p. on belt; recommended for 32-in. thresher; 3,750 lbs. pull at plowing speed; 2 speeds forward, 2 and 3.2 m. p. h.; diameter turning circle 21 ft. Motor: Own, 2 cylinders twin horizontal, valve in head, 8x10 in., 450 r. p. m.; recommended fuels, kerosene or distillate. Lubrication: Madisan-Kipp force feed oiler and splash; heavy oil recommended. Bearings: Plain in wheels; 2 Hyatt rollers in rear axle; 6 Hyatts and 2 bronze in transmission. Transmission: Own enclosed spur gears, finished. Final drive: Open bull gears and pinions. Drive wheels 64 in. high, 20 in. wide. Pulley: 26x9 in., 450 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 3,100 ft. per min. 3 fuel tanks, gasoline 1 gal., kerosene 41 gals., water 29 gals. Donaldson dry air cleaner. Bosch magneto with impulse starter. Own governor. Secor-Higgins 2¾-in. carburetor. Cooling: Own radiator, pump circulation; cooling medium, oil; no fan. Spark plugs ⅞ in. S. A. E. 5 rings to pistons, 8x7-16 in. Lateral adjustment of hitch 32 in., vertical 3 in. Tractor dimensions: Length 175 in., width 89 in., height 108 in.; shipping weight 13,900 lbs.

ADVANCE-RUMELY THRESHER CO., LA PORTE, IND.
OILPULL 30-60.



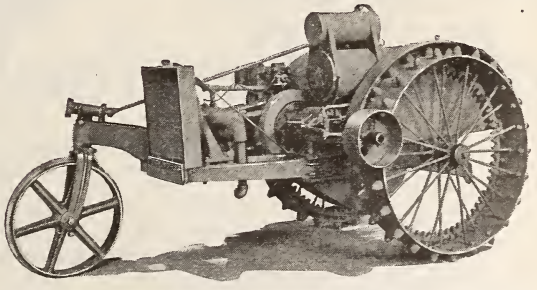
An 8 to 10-plow tractor with 2 drive wheels and 2 steering wheels; 30 h. p. on drawbar, 60 h. p. on belt; recommended for 36-in. thresher; 5,900 lbs. pull at plowing speed; 1 speed forward, 1.9 m. p. h. Motor: Own 2 cylinders twin horizontal, 10x12 in., 375 r. p. m.; recommended for kerosene or distillate. Lubrication: Madison-Kipp force feed oiler and splash; heavy oil recommended. Plain bearings throughout. Transmission: open spur gears, finished. Final drive: Open bull pinions and gears. Drive wheels 80 in. high, 30 in. wide. Pulley: 36x11 in., 375 r. p. m.; controlled through motor clutch; mounted on crankshaft; belt speed 3,540 ft. per min. 3 fuel tanks, gasoline 3 gals., kerosene 70 gals., water 85 gals. No air cleaner. Bosch magneto. Own governor. Secor-Higgins carburetor, 3¼ in. Cooling: Own radiator, pump circulation; cooling medium, oil; no fan. 5 rings to pistons, 10x⅝ in. Lateral adjustment of hitch 68 in. Tractor dimensions: Length 228 in., width 116 in., height 132 in.; shipping weight 26,700 lbs.

ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.
ALLIS-CHALMERS 6-12 GENERAL PURPOSE.



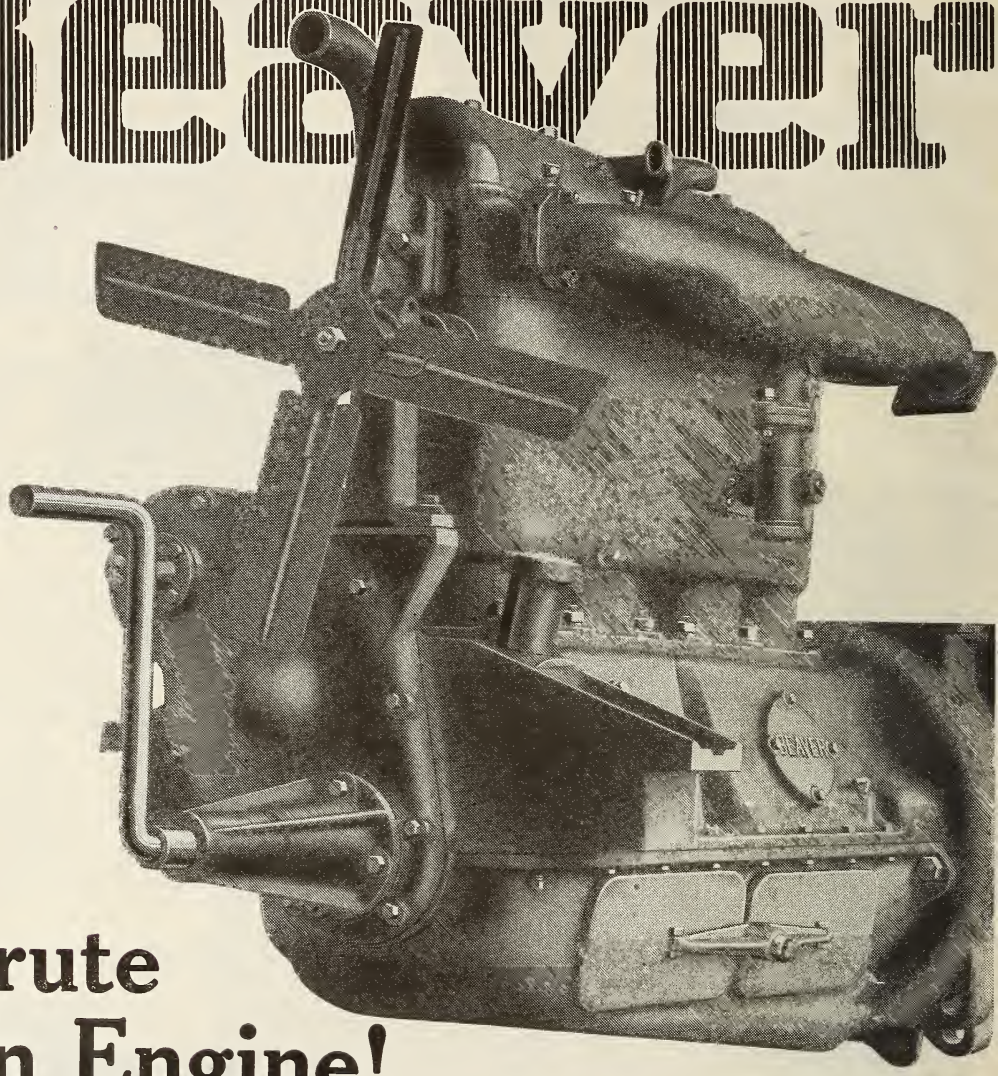
A 2-wheel general purpose tractor for cultivating and pulling one 16-in. bottom; 6 h. p. on drawbar, 12 h. p. on belt; 1,000 lbs. pull at plowing speed; 2 speeds forward, 1.8 and 2½ m. p. h.; turning circle 14 ft. Motor: Own, 4 cylinders vertical, valve in head, 3⅛x4½ in., 800 r. p. m. Recommended fuel, gasoline. Lubrication, circulating splash. Babbitt bearings throughout. Transmission: Enclosed gears, finished. Final drive: Open bull pinion and gear. Drive wheels 48 in. high, 6 in. wide. Pulley: 10x5 in., 1,000 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,600 ft. per min. 1 fuel tank, capacity 10 gals. Bennett centrifugal air cleaner. Magneto ignition. Own governor. Cooling: Own radiator, thermo-syphon circulation. Spark plugs ⅞ in., A. L. A. M. Width of tractor 54 in.; shipping weight 1,850 lbs.

ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.
A. C. 10-18.



A 2-plow tractor with 2 drive wheels and 1 steering wheel; 10 h. p. on drawbar, 18 h. p. on belt; 1,650 lbs. pull at plowing speed, 2⅛ m. p. h.; operating weight 4,900 lbs.; turning circle 16 ft. Motor: A. C., T head, 2 cylinders horizontal, 5¼x7 in.; 720 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Detroit 6 feed oiler. Enclosed gear transmission, 1 speed forward. Final drive: Direct to driving axle, roller pinions and bull gears. Drive wheels: 60 in. high, 12 in. wide. Pulley: 14x6½ in., 720 r. p. m.; controlled through motor clutch; driven direct from motor; belt speed 2,600 ft. per minute. 2 fuel tanks, 20 gals. kerosene, 5 gals. gasoline. Bennett air cleaner, centrifugal type. Ignition: Kingston

THE TRACTOR ENGINE BEAVER



A Brute of an Engine!

The most fearful punishment that an engine can get, it receives in tractor service. The strain of continuous pulling, the heat and the dust, will rack it to pieces mighty quick—unless it's truly built for the work as BEAVER is.

BEAVER Engine is a brute for strength. Such rods and bearings and crankshaft you never saw before in an engine of this size. Big in every working part, it hauls its heavy load for hours without strain.

It is a valve-in-head motor, burning kerosene. The power developed by its four great 4½x6-inch* cylinders is applied at the low speed of 950 R. P. M. The compression is figured at a pounds-pressure accurately determined to produce power at its highest and smoothest. Its cooling and oiling systems are marvels. Its accessibility leaves nothing to be improved upon.

If you've ever watched a BEAVER-powered tractor work, you've seen a remarkable exhibition of cool, steady, tireless pulling!

Several makes of high-powered, medium-sized tractors are making performance records with the help of BEAVER Engine. They're proving every day that BEAVER is both *Practically* and *Engineeringly* right!

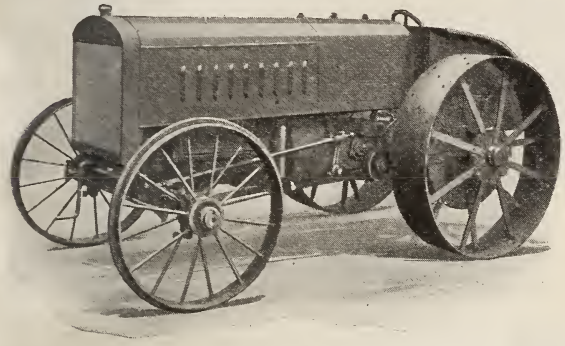
*Also made 4¾x6"

BEAVER MANUFACTURING CO.
Milwaukee, Wis.

or K-W magneto, high tension, with impulse starter. Own fly ball governor. Carburetor: Kingston, double bowl, 1½ in. inlet; mixture heated by hot spot in manifold. Cooling: Water; own radiator, pump circulation. Spark plugs: Champion, ⅞ in., 18 threads. Piston rings, 3 to piston; diameter 5.25 in., width .311 in. Hitch: Swinging type, 17 in. high normal, 6 in. vertical adjustment. Frame: One piece, without bolts or rivets, mounted solid: Dimensions: Length over all 140 in., width 68 in., height 75 in.; wheel base 96 in.; shipping weight 4,800 lbs.; 222 cu. ft. packed for export.

ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.

ALLIS-CHALMERS 15-30.



A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; 3,300 lbs. pull at plowing speed; 2 speeds forward, 2.3 and 2.8 m. p. h.; diameter turning circle 16 ft. Motor: Own 4 cylinders vertical, valve in head, 4¾x6½ in., 830 r. p. m.; recommended fuels, kerosene and gasoline. Lubrication: Detroit mechanical oiler. Transmission: Enclosed gears, own make, finished. Final drive: Bull pinions and gears, enclosed. Drive wheels 48 in. high, 12 in. wide. Pulley: 15x7½ in., 660 r. p. m.; driven through gears; belt speed 2,600 ft. per min. Bennett centrifugal air cleaner. Magneto ignition with impulse starter. Own governor. Kingston double bowl carburetor. Spark plugs ⅞ in., A. L. A. M. Width of tractor 66 in.; shipping weight 5,300 lbs.

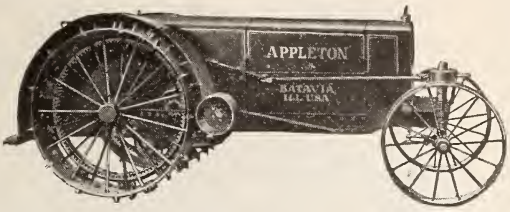
AMERICAN TRACTOR & FOUNDRY CO., CHARLES CITY, IA.

AMERICAN 15-30.

A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; 2 speeds forward, 2¼ and 3½ m. p. h.; 28 ft. turning circle. Motor: Beaver, valve in head, 4 cylinders vertical, 4¾x6 in., 900 r. p. m.; fuel recommended, kerosene, distillate or gasoline. Force feed lubrication to motor bearings; sight feed leads to rear axle and drive pinions. Hyatt roller bearings throughout. Transmission: Foote enclosed gears, finished. Final drive: Open bull pinions and gears. Drive wheels 52 in. high, 12 in. wide. Pulley: 18x7 in., 550 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,585 ft. per min. 2 fuel tanks, 8 and 25 gals. Bennett centrifugal air cleaner. Bosch magneto with impulse starter. Built-in ball bearing governor. Holley 1½-in. carburetor. Cooling: S-J radiator, pump circulation; "Motor Eye" temperature indicator; 22-in. Spartan fan. Hitch: Attached to frame midway between front and rear wheels; 40 in. lateral adjustment, 17 in. clearance. Tractor dimensions: Length 126 in., width 75 in., height 58 in.; shipping weight 5,200 lbs.

APPLETON MFG. CO., BATAVIA, ILL.

APPLETON 12-20.



A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; 2,200 lbs. pull at plowing speed; recommended for 24-in. thresher; 2 speeds forward, 2 and 3½ m. p. h.; turning circle 20 ft.; retail price Jan. 1, 1919, $1,800 f. o. b. factory. Motor: Buda 4 cylinders vertical, L head, 4¼x5½ in., 1,000 r. p. m.; recommended fuels, gasoline or kerosene. Lubrication: Internal force feed; recommended oil, Mobiloil B in summer, A in winter. Bearings: Front wheels, plain; rear wheels, transmission and jackshaft, Hyatt roller; fan, balls. Transmission: Nuttall enclosed gears, finished. Final drive: Bull pinions and gears, open. Drive wheels 54 in. high, 12 in. wide. Pulley: 12x7½ in., 825 r. p. m.; controlled through motor clutch; driven through gears; belt speed 2,600 ft. per min. 2 fuel tanks, capacity 25 gals. each. Bennett centrifugal air cleaner. Bosch magneto without impulse starter. Pickering governor. Schebler 1¼-in. carburetor. Cooling: Spirex radiator, pump circulation; 20-in. Oakes fan, pulleys 2 in. wide; flat fan belt, 35x2 in. Champion or Rajah spark plugs, ⅞ in. S. A. E. Lateral hitch adjustment 24½ in. Tractor dimensions: Length 13 ft. 6 in., width 5 ft. 7½ in., height 5 ft. 1 in.; shipping weight 5,000 lbs. Distributors: Appleton Mfg. Co., Minneapolis, Minn., Columbus, O., Omaha, Neb.

AULSON TRACTOR CO., WAUKEGAN, ILL.

AULSON.

A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 34 h. p. on belt; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 4 m. p. h.; recommended for 26-in. thresher; diameter turning circle 18 ft.; retail price Jan. 1, 1919, $2,150 f. o. b. factory. Motor: Climax 4 cylinders vertical, T head, 5x6½ in., 850 r. p. m.; recommended fuels, kerosene or gasoline. Lubrication: Internal force feed; recommended oil, Polarine extra heavy both summer and winter. Transmission: Enclosed gears, finished. Final drive: Open chain. Drive wheels 48 in. high, 8 in. wide. Two pulleys, 16x8 and 7x5 in., respectively, 562 r. p. m.; controlled through motor clutch; driven through gears; belt speeds 2,350 and 1,030 ft. per min. 2 fuel tanks, capacity 20 and 5 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Climax governor. Stromberg 1½-in. carburetor. Cooling: Hooven radiator, pump circulation; Oakes 18-in. fan; flat belt, 3x2 in. pulleys. Spark plugs, ⅞ in. S. A. E. Hitch: Lateral adjustment 15 in., vertical adjustment 4 in. Tractor dimensions: Length 11 ft., width 6 ft. 4 in., height 5 ft. 8 in.; shipping weight 6,000 lbs.

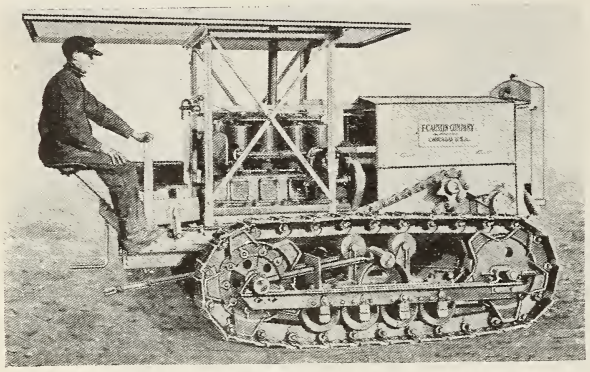
AULTMAN & TAYLOR M'CH'Y CO., MANSFIELD, O.

AULTMAN & TAYLOR 15-30.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt. Motor: Waukesha 4 cylinders vertical, L head, 4¾x6¾ in., 800 r. p. m.; recommended fuels, gasoline or kerosene. Splash lubrication. Bearings: Front and rear wheels plain; transmission and jackshaft, Hyatt rollers; fan, balls. Transmission: Enclosed gears, finished. Final drive:

THE AUSTIN STANDARDIZED TRACTOR LINE

FOUR-SIX PLOWS



MODEL 40

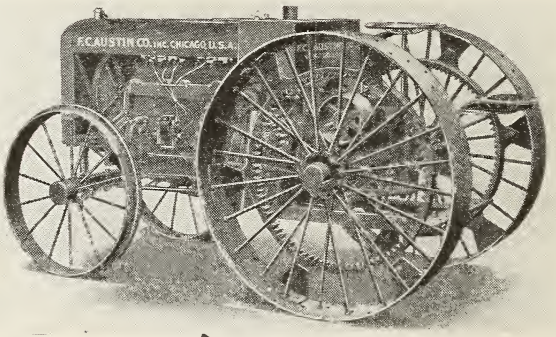
40 Belt Horsepower
20 Drawbar Horsepower
3 Speeds and Reverse
Direct Plowing Speed
Long-Life Multipedals
Large Bearing Area
Either Gasoline or
Kerosene Fuel

STRENGTH

EFFICIENCY

THREE-FOUR PLOWS

30 Belt Horsepower
4 Speeds Ahead and reverse
Unit Power Plant
Manganese Steel Bull Gears and Pinion



MODEL 30

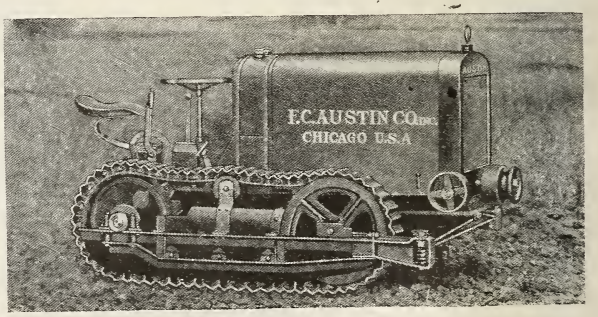
15 Drawbar Horsepower
Enclosed Gears
Either Gasoline or Kerosene Fuel
Interchangeable Wheels or Multipedals

ENDURANCE

20 Belt Horsepower
12 Drawbar Horsepower
2 Speeds and Reverse
All Multipedal Wearing Parts of Manganese Steel and Arranged to Be Renewed
Enclosed Gearing Dustproof
Either Gasoline or
Kerosene Fuel

ECONOMY

TWO-THREE PLOWS



MODEL 20

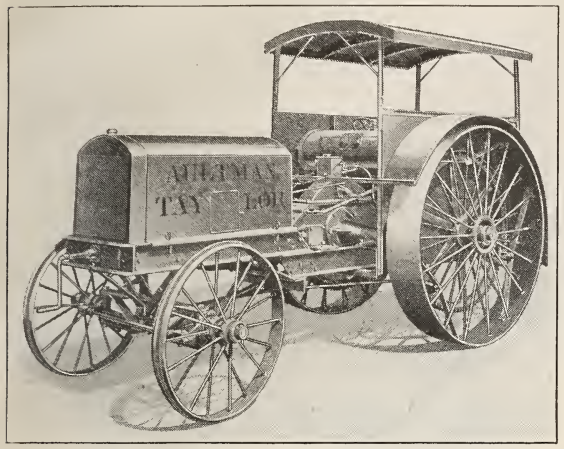
Ask for Booklet T-107

The F. C. AUSTIN COMPANY, Inc.

Main Office—Railway Exchange Bldg. **CHICAGO, ILL.**

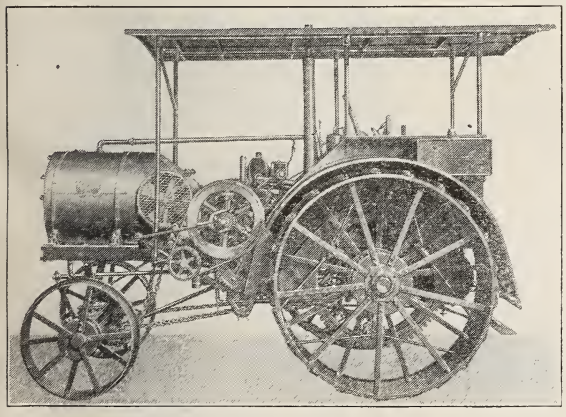
New York Office—30 Church St.

Open bull pinions and gears. Drive wheels 70 in. high, 12 in. wide. Pulley: 20x8 in., 400 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,100 ft. per min. Bennett centrifugal air cleaner. Eisemann magneto with impulse starter. Waukesha built-in gov-



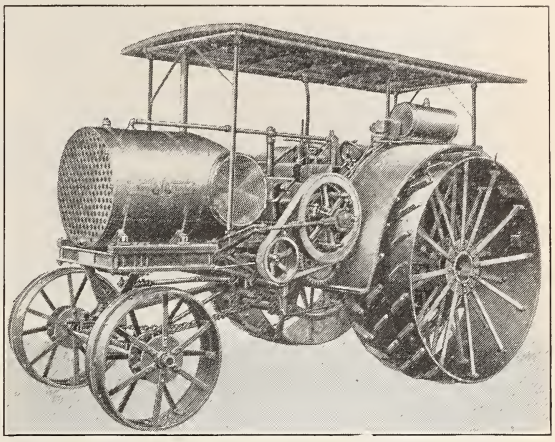
ernor. Kingston 1¼-in. carburetor. Cooling: Hooven radiator; pump circulation; Gakes 20-in. fan; pulleys 8x3 in., flat 1½-in. belt. Champion spark plugs, ⅞ in. S. A. E. 3 rings to pistons, 4¾x¼ in. Tractor dimensions: Length 14 ft. 8 in., width 6 ft. 8 in., height 8 ft. 8 in.; shipping weight approximately 7,500 lbs.; 270.2 cu. ft. packed for export.

AULTMAN & TAYLOR M'CH'Y CO., MANSFIELD, O.
AULTMAN & TAYLOR 22-45.



A 6-plow tractor with 2 drive wheels and 2 steering wheels; 22 h. p. on drawbar, 45 h. p. on belt; 1 speed forward, 2.93 m. p. h.; diameter turning circle 15 ft. Motor: Own 4 cylinders horizontal, valve in head, 5½x 8 in., 600 r. p. m.; recommended fuels, gasoline or kerosene. Lubrication: Detroit mechanical oiler and splash. Plain bearings throughout. Transmission: Own, open gears, rough. Final drive: Bull pinions and gears, open. Drive wheels 70 in. high, 20 in. wide. Pulley: 20x10 in., 600 r. p. m.; controlled by independent friction clutch; driven from crankshaft; belt speed 3,140 ft. per min. 2 fuel tanks, capacity 35 and 10 gals. Eisemann or Bosch dual magneto without impulse starter. Own flyball governor. Kingston 2-in. carburetor. Cooling: Own tubular radiator, pump circulation; 18-in. fan. Champion ½-in. spark plugs, pipe thread. 4 rings to pistons, 5½x⅝ in. Tractor dimensions: Length 13 ft. 10 in., width 8 ft. 9¾ in., height 10 ft. 5 in.; shipping weight 11,700 lbs.

AULTMAN & TAYLOR M'CH'Y CO., MANSFIELD, O.
AULTMAN & TAYLOR 30-60.

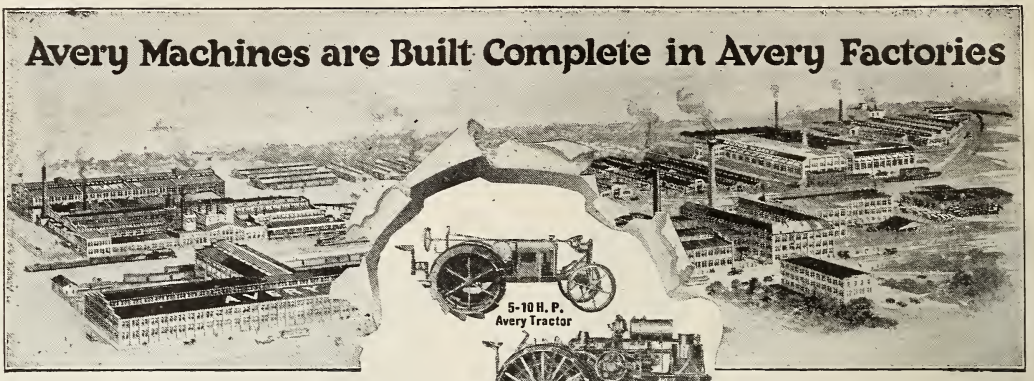


An 8 to 12-plow tractor with 2 drive wheels and 2 steering wheels; 30 h. p. on the drawbar and 60 h. p. on belt; 8,000 lbs. pull at plowing speed; recommended for 36x56 in. thresher with feeder and wind stacker; 1 speed forward, 2.2 m. p. h.; operating weight 23,000 lbs.; turning circle 39 ft. Motor: Own make, valve in head, 4 cylinders, horizontal, 7x9 in.; normal compression 70 lbs.; 500 r. p. m. normal; fuel recommended, gasoline or kerosene. Lubrication: Detroit oiler and splash. Plain bearings throughout. Transmission: Open gears, 1 speed forward, bull gears cast. Final drive: Open spur gear. Diameter rear axle 4¼ in. Drive wheels, 90 in. high, 24 in. wide. Pulley: 24x11 in.; 500 r. p. m. normal; control by friction clutch; belt speed 3,100 ft per minute. 2 fuel tanks, 20 and 60 gals. Ignition: Eisemann or Bosch magneto. Own governor, fly ball type. Carburetor: Kingston, single bowl, 2½ in. inlet; mixture heated by water jacketed manifold and exhaust. Cooling: Water, own radiator, centrifugal pump circulation. Spark plugs: Rajah or Champion, 1 to cylinder, ½ in. pipe thread. Piston rings: 5 to piston; diameter 7 in., width ⅜ in. Hitch 24 in. high. Dimensions: Length over all 218 in., width 131 in., height 136½ in.; wheel base, 136 in.; shipping weight 20,200 lbs.

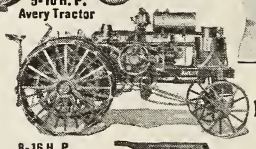
F. C. AUSTIN CO., INC., CHICAGO, ILL.
AUSTIN TRACTOR CULTIVATOR.

A 3-wheel tractor cultivator for one plow; 6 h. p. on drawbar, 15 h. p. on belt; 1,000 lbs. pull at plowing speed; 1 speed forward, 2.4 m. p. h.; diameter turning circle, 15 ft. Motor: Le Roi, L head, 4 cylinders vertical, 3⅛x4½ in., 1,000 r. p. m.; recommended fuel, gasoline. Lubrication: Circulating splash. Bearings: Front wheels, Gurney; transmission, Gurney and New Departure balls. Transmission: Own, worm and gear, enclosed, finished. Final drive: Bull pinion and gear, open. Traction: 2 drive wheels, 37 in. high, 4 in. wide. 1 fuel tank, 12 gals. capacity. Orem air cleaner. Bosch magneto with impulse starter. Kingston carburetor. Modine radiator, pump circulation. Champion spark plugs ⅞ in. S. A. E. 3 rings to pistons, 3⅛x3-16 in. Tractor dimensions: Length 13 ft., width 2¾ ft. in plowing, 3¾ ft. in cultivating, height 4 ft.; shipping weight, 800 lbs.

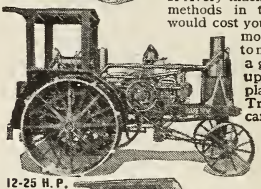
Avery Machines are Built Complete in Avery Factories



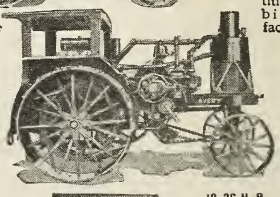
5-10 H. P. Avery Tractor



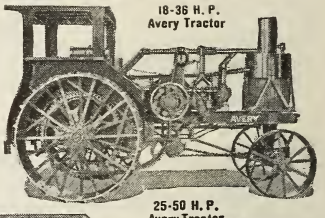
8-16 H. P. Avery Tractor



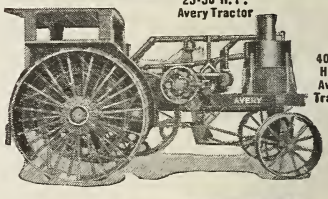
12-25 H. P. Avery Tractor



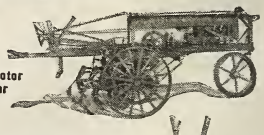
18-36 H. P. Avery Tractor



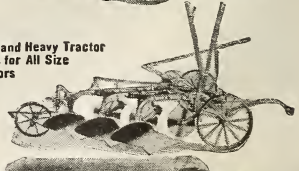
25-50 H. P. Avery Tractor



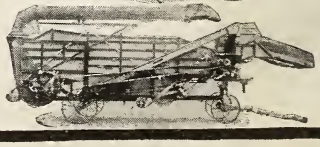
40-80 H P. Avery Tractor



Avery Motor Cultivator



Light and Heavy Tractor Plows for All Size Tractors



There's a Size Avery Thresher for every Size Rnn

This Means—The Same High Standard of Workmanship Throughout—Prompt and Efficient Service to You and Your Customers

THERE is a big difference between a tractor built by **one** company and a tractor whose units are built by **several** companies and then assembled together. Avery Tactors are built complete in three big Avery factories. The Avery Company are builders, not assemblers. Avery dealers and users know where to go for service and renewal parts should they be needed.

There is but one organization back of every unit in the Avery Tractor. This means dependability—the big feature that you and your customers are looking for in tractor service.

Big Output, Popular Priced Machines

If Avery machines were built by ordinary methods in the ordinary factory they would cost you and your customers more money It takestwo good things to make a good machine. First, a good design and second, an up to-date manufacturing plant. The reason why Avery Tractors are so well built and can be sold at such low prices is, because they are manufactu.ed by one concern in large quantities in their own big modern factories.

Extraordinary Selling Features

Avery motors are special low speed tractor motors, with renewable cylinder walls, adjustable crankshaft bearings, and gasifiers that turn kerosene and distillate into gas.

The five sizes of Avery Tractors from 8-16 to 40-80 h. p. are of the same design. All are equipped with this special tractor motor which has more original features than any other tractor motor built.

All have the patented Avery sliding frame transmission.

Sell The Line That Insures Future Business

When you sell an Avery Tractor it is usually not long before you sell another in the same neighborhood. One Avery sells another.

The Avery line is the one complete standardized line of motor farming machinery. There are six sizes of Avery Tractors—a size for every size farm. This means that every tractor prospect is an Avery Tractor prospect. There are also eight sizes of Avery Grain-Saving Threshers and a size Avery plow for every size tractor. In addition you get the sale of the Avery Motor Cultivator, the greatest agricultural machine invented since the binder.

It makes the motorization of every farm crop possible.

For Information About Our 1919 Sales Proposition Write

AVERY COMPANY, FACTORY AND MAIN OFFICE **PEORIA, ILLINOIS**

Branch Houses: Madison, Fargo, Omaha, Minneapolis, Grand Forks, Sioux Falls, Aberdeen, Billings, Lincoln, Des Moines, Indianapolis, Columbus, Kansas City, Wichita

Jobbers: AVERY COMPANY OF TEXAS,
Dallas, Amarillo and Beaumont, Texas
Also Other Principal Machinery Centers

AVERY

Motor Farming, Threshing and Road Building Machinery

F. C. AUSTIN CO., INC., CHICAGO, ILL.
MULTIPEDAL 12-20.

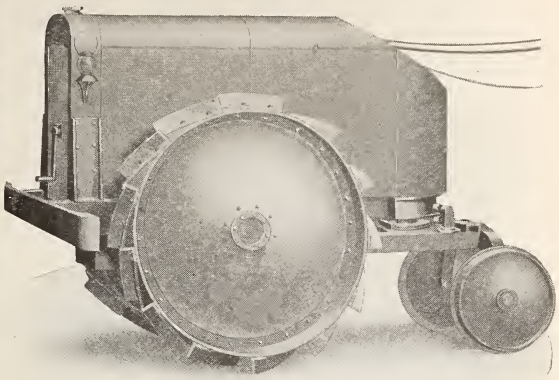
A 2 or 3-plow tractor with 2 tracklayer drivers; 12 h. p. on drawbar, 20 h. p. on belt; 2,000 lbs. pull at 2⅓ m. p. h.; 2 speeds forward, 2 1-3 and 3 1-3 m. p. h.; turning circle, 12 ft. Size thresher recommended, 20-in. Motor: Buffalo, L head, 4 cylinders vertical, 4x5; 1,000 r. p. m. Fuels recommended, gasoline or kerosene. Lubrication: Circulating splash. Bearings: Front sprockets, manganese bronze; rear sprockets, Hyatt roller; transmission, Hyatt and Standard roller; jackshaft, Hyatt and New Departure balls. Transmission: Enclosed gear, own make, finished. Final drive: Bull pinion and gear, enclosed. Traction: 2 tracklayers, 50 in. long on ground and 8 in. wide. Pulley: 8x6½ in., 1,000 r. p. m.; controlled through independent friction clutch; driven through gears; belt speed 2,100 ft. per min. 2 compartment fuel tank, capacity 12 and 1½ gals. Orem air cleaner. Bosch magneto with impulse starter. Built-in governor. Kingston carburetor. Cooling: Modine radiator, pump circulation; 16 in. fan; pulleys, 2¼x 1 in.; flat 1 in. belt. Champion spark plugs, ⅞ in. S. A. E. Swinging hitch, lateral adjustment, 10 in. Tractor dimensions: Length 106 in., width 56½ in., height 54 in.; shipping weight 3,400 lbs.

F. C. AUSTIN CO., INC., CHICAGO, ILL.
MULTIPEDAL 75-125.

A tractor having two tracklayer drivers and one front wheel; 75 h. p. on drawbar, 125 h. p. on belt; 12,500 lbs. pull at 2¼ m. p. h.; 3 speeds forward, 1½, 2¼ and 3½ m. p. h.; diameter turning circle, 50 ft. Motor: Buffalo, 6 cylinders vertical, L head, 7½x9 in., 550 r. p. m.; recommended fuels, gasoline or kerosene. Lubrication: External mechanical oiler. Bronze bushed bearings throughout. Transmission: Enclosed gears, own make, finished. Final drive: Bull pinion and gear, enclosed. Two tracklayer wheels, 74 in. long on ground, 24 in. wide. Pulley: 22x12 in., 475 r. p. m.; driven through gears; belt speed 2,730 ft. per min. 2 compartment fuel tank, capacity 75 and 5 gals. Orem air cleaner. Magneto ignition. Built-in governor. Kingston carburetor. Modine radiator, pump circulation. Champion spark plugs, ½ in. 4 rings to piston, 7½x¼ in. Dimensions: Length over all, 24 ft. 1 in., width 8 ft. 10 in., height 9 ft. 10 in.; shipping weight, 28,000 lbs.

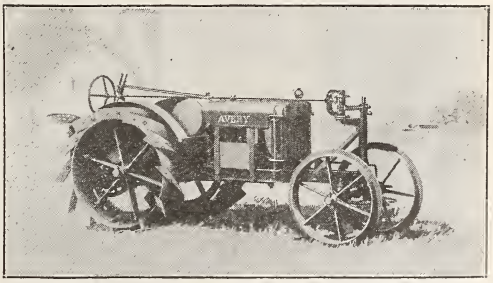
AUTOMOTIVE CORP., FORT WAYNE, IND.
AUTOMOTIVE.

A 2-plow tractor with 2 drive wheels in front and 2 supporting wheels in rear; 12 h. p. on drawbar, 22½ h. p. on belt; 2 speeds forward, 2 and 5 m. p. h.; diameter turning circle 12 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,450. Motor: Buda, 4 cylinders vertical, L head, 3¾x5½ in., 850 r. p. m.; recommended for gasoline or kerosene. Bearings: Drive wheels Timken roller and balls; rear trailer wheels, plain; transmission, Hyatt rollers. Own transmission, enclosed and finished gears. Final drive: Torbensen internal gear drive with M. and S. locking differential. Drive wheels 42 in. high, 12 in. wide. Pulley: 12x8 in., 800 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,513 ft. per



min. at 800 r. p. m. 2 fuel tanks, 4 and 18 gals. Bennett centrifugal air cleaner. Eisemann magneto with impulse starter. Pierce governor. Rayfield 1¼-in carburetor. Cooling: Long radiator, pump circulation; Oakes 16-in. fan; pulleys 2 in. wide, flat belt. Vertical adjustment of hitch 4 in. Tractor dimensions: Length 100 in., width 62 in., height 66 in.; shipping weight about 2,800 lbs. Control: All operations handled by 3 leather lines; one for gear shifting, the other two control the speed, operate clutch and steer. Driver may sit on tractor or operated machine or vehicle.

AVERY CO., PEORIA, ILL.
AVERY 5-10 MODEL B.



A 2-plow (12-in. bottoms) tractor with 2 drive wheels and 2 steering wheels; 5 h. p. on drawbar, 10 h. p. on belt, own rating; 2 speeds forward, 1¼ and 4¼ m. p. h.; diameter turning circle 21 ft.; retail price Jan. 1, 1919, $550 f. o. b. factory. Motor: Own, 4 cylinders vertical, L head, 3x4 in., 1,200 r. p. m.; recommended for gasoline or kerosene. Circulating splash lubrication. Bearings: Rear wheels, Hyatt roller; transmission, roller and ball; jackshaft, plain; fan, ball. Transmission: Enclosed sliding gears, finished. Final drive: Bull gear and pinion, open. Drive wheels 38 in. high, 10 in. wide. Pulley: Regular equipment, 5¼x6¼ in., gear driven after removing rear wheel; special equipment, chain driven pulley, 12x5¼ in. 1 fuel tank, 11 gals. K-W magneto with impulse starter. Own throttling governor. Kingston ¾-in. carburetor. Cooling: Own radiator, thermo-sy-

The World's best-known Farm Tractor

THE "Caterpillar" Tractor was invented by Benjamin Holt for the American farmer. In the farmer's hands it made good. Then industrial users all over the world proved it the most economical solution of their difficult power problems—hauling ore over rocky mountain roads; bringing log trains through rough, winding forest trails; moving necessities across sandy deserts; building aqueduct or reservoir, highway or drainage canal; clearing land and making farms of it.

A decade of commercial success in conquering the "impossible" put such stamina into this Tractor as to make it the unanimous choice of Allied army engineers for military transportation. But the "Caterpillar" is still a farm tractor—*extraordinary*. As a farm investment it is like a concrete building, returning all it costs in added service and satisfaction.

The "CATERPILLAR" Tractor is built only by The Holt Manufacturing Company, Stockton, Calif., and Peoria, Ill.

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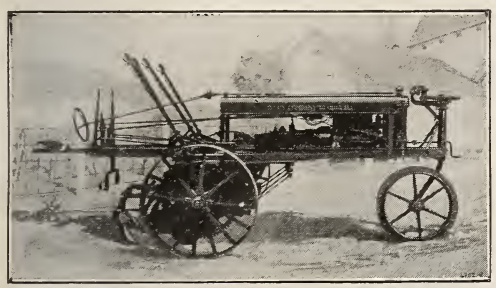
Write for detailed information.

"CATERPILLAR"
TRACTORS REG. U.S. PAT. OFF.

phon circulation; Oakes 15½-in. fan; pulleys 5 and 2½ in. diameter, ⅝ in. wide; flat belt 31¾ in. long, 1½ in. wide. Spark plugs ⅞ in. S. A. E. 3 rings to piston, width 3-16 in. Lateral hitch adjustment 18 in. Tractor dimensions: Length 135 in., width 50 in., height 54 in.; shipping weight 2,600 lbs. Branches: Aberdeen, S. D., Des Moines, Ia., Kansas City, Mo., Omaha, Neb., Lincoln, Neb., Wichita, Kan., Grand Forks, N. D., Fargo, N. D., Sioux Falls, S. D., Billings, Mont., Madison, Wis., Columbus, O., Minneapolis, Minn., Indianapolis, Ind., Avery Co. of Texas, Dallas, Amarillo and Beaumont.

AVERY CO., PEORIA, ILL.
AVERY MOTOR CULTIVATOR 5-10.

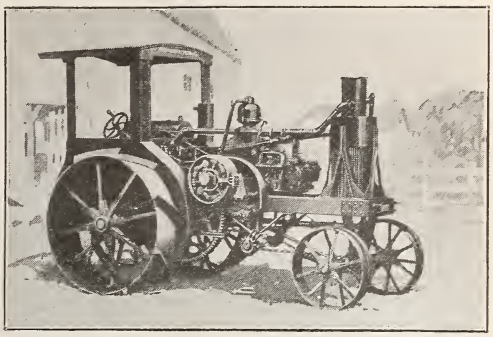


A motor cultivator and planter with 2 drive wheels and 1 caster wheel in front; 5 h. p. on drawbar, 10 h. p. on belt, own rating; 1 speed change forward, 3 m. p. h.; diameter turning circle, 18¾ ft. Motor: Own make, L head, 4 cylinders vertical, 3x4 in., 1,200 r. p. m.; fuel recommended, gasoline or kerosene. Circulating splash lubrication. Hyatt roller bearings. Transmission: Own, sliding gear, enclosed, finished. Final drive: Open spur gears. Height of drive wheels 42 in., width 5 in. Pulley: 9x9 in., 1,000 r. p. m.; driven through gears; belt speed 2,350 ft. per min. 1 fuel tank, 9 gals. K-W magneto with impulse starter. Own governor. Kingston ¾-in. carburetor. Cooling: Own radiator, thermo-syphon circulation. Spark plugs, ⅞ in. S. A. E. Tractor dimensions: Length 184 in., width 112 in., height 65 in.; shipping weight 3,050 lbs.

AVERY CO., PEORIA, ILL.
AVERY 8-16.

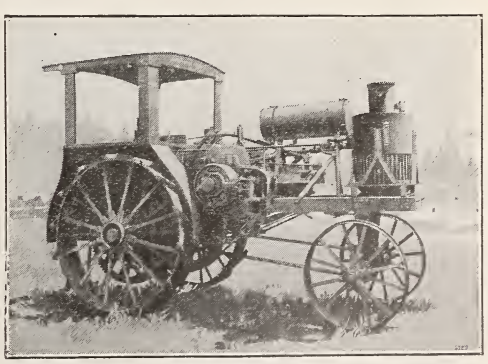
A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; 8 h. p. on drawbar, 16 h. p. on belt, own rating; recommended for 19-in. thresher; 2 speeds forward, 1¾ and 3 m. p. h.; diameter turning circle 22 ft. Motor: Own, valve in head, 2 cylinders opposed, 5½x6 in., 600 r. p. m.; fuel recommended, kerosene, gasoline and distillate. Circulating splash lubrication. Plain bearings. Transmission: Own make, sliding spur gears (telescopic type), open. Final drive: Spur gear, open. Height of drive wheels 50 in., width 12 in. Pulley: 18x7 in., 600 r. p. m.; belt speed 2,820 ft. per min. 2 fuel tanks, 2 and 12 gals. High tension K-W magneto. Own make governor. Kingston 1¼-in. double bowl carburetor. Cooling: Tubular radiator, thermo-syphon circulation. Spark plugs, ½ in. standard. 5 rings to piston, width ⅜ in. Tractor dimensions: Length 130 in., width 56 in., height 72 in.; shipping weight 4,900 lbs.

AVERY CO., PEORIA, ILL.
AVERY 12-25.



A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt, own rating; recommended for 22-in. thresher; 2 speeds forward, 1¾ and 2¾ m. p. h.; diameter turning circle 28 ft. Motor: Own, 2 cylinders opposed, valve in head, 6½x7 in., 670 r. p. m.; recommended for kerosene, gasoline, distillate, etc. Circulating splash lubrication. Plain bearings throughout. Transmission: Avery sliding spur gears, telescopic type, open. Final drive: Open spur gears and pinions. Drive wheels 56 in. high, 20 in. wide. Pulley: 19½x7 in., 570 r. p. m.; mounted on crankshaft extension; belt speed 2,900 ft. per min. 2 fuel tanks, 6¾ and 14 gals. K-W magneto. Own governor. Kingston 1½-in. double bowl carburetor. Cooling: Tubular radiator, thermo-syphon circulation, no fan. Spark plugs ½ in. standard. Tractor dimensions: Length 164 in., width 80 in., height 105 in.; shipping weight 7,500 lbs.

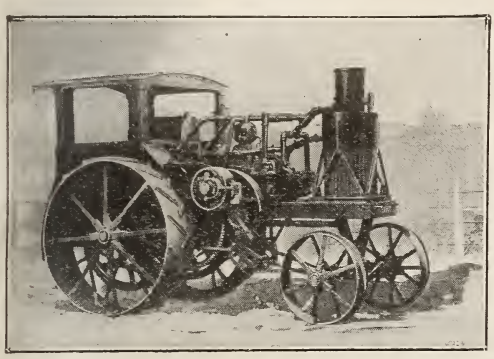
AVERY CO., PEORIA, ILL.
AVERY 14-28.



A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 14 h. p. on drawbar, 28 h. p. on belt, own rating; recommended for 22-in. thresher; speeds forward, 2 to 3 m. p. h.; diameter turning circle, 12 ft. Motor: Own make, valve in head, 4 cylinders horizontal opposed, 4⅞x7 in., 650 r. p. m.; fuel recommended, kerosene, gasoline and distillate. Circulating splash lubrication. Hyatt roller bearings. Transmission: Own

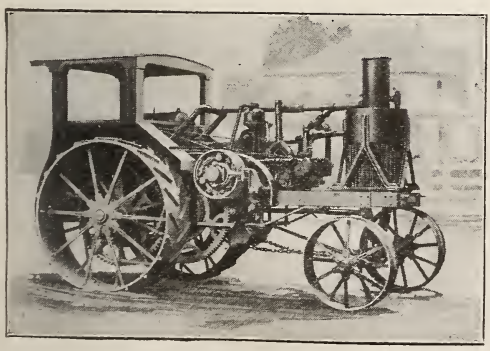
make, sliding spur gears (telescopic type), open. Final drive: Spur gear. Height of drive wheels 60 in., width 12 in. Pulley: 16x7 in., 700 r. p. m.; belt speed 2,925 ft. per min. 2 fuel tanks, 3¼ and 20 gals. K-W high-tension magneto. Own make governor. Kingston 1¼-in. double bowl carburetor. Cooling: Tubular radiator, thermo-syphon circulation, no fan. Spark plugs, ½ in. standard. 5 rings to piston, width 5-16 in. Tractor dimensions: Length 152 in., width 68 in., height 104 in.; shipping weight 6,800 lbs.

AVERY CO., PEORIA, ILL.
AVERY 18-36.



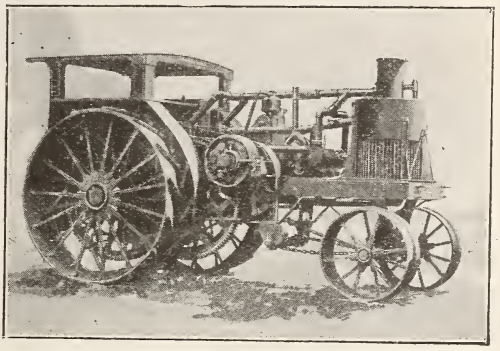
A 4 to 5-plow tractor with 2 drive wheels and 2 steering wheels; 18 h. p. on drawbar, 36 h. p. on belt, own rating; 2 speeds forward, 2 to 3 m. p. h.; diameter turning circle 29 ft. Motor: Own, 4 cylinders double horizontal opposed, valve in head, 5½x6 in., 650 r. p. m.; recommended for kerosene, gasoline, distillate, etc. Circulating splash lubrication. Plain bearings throughout. Transmission: Avery sliding spur gears, open. Final drive: Spur pinions and gears. Drive wheels 65 in. high, 20 in. wide. Pulley: 18x8 in., 650 r. p. m.; mounted on crankshaft extension; belt speed 3,055 ft. per min. 2 fuel tanks, 6 and 27 gals. K-W high tension magneto. Own governor. Kingston 1½-in. double bowl carburetor. Cooling: Tubular radiator, thermo-syphon circulation, no fan. Spark plugs ½ in. standard. 5 rings to piston, width ⅜ in. Tractor dimensions: Length 152 in., width 84 in., height 105 in.; shipping weight 9,250 lbs.

AVERY CO., PEORIA, ILL.
AVERY 25-50.



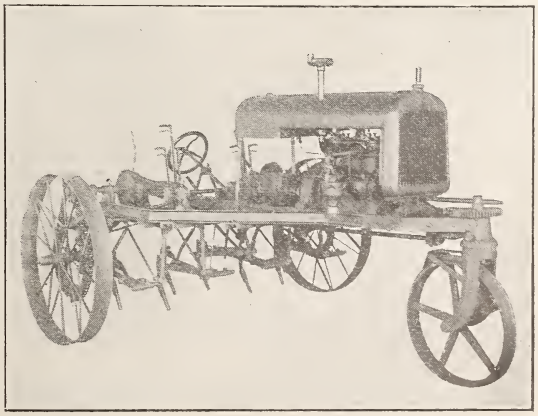
A 5 to 6-plow tractor with 2 drive wheels and 2 steering wheels; 25 h. p. on drawbar, 50 h. p. on belt, own rating; 2 speeds forward, 2 and 3 m. p. h.; recommended for 32-in. thresher; diameter turning circle 20 ft. Motor: Own, 4 cylinders double horizontal opposed, valve in head, 6½x7 in., 500 r. p. m.; recommended for kerosene, gasoline, distillate, etc. Circulating splash lubrication. Plain bearings throughout. Transmission: Avery sliding spur gears, open. Final drive: Open spur gears and pinions. Drive wheels 69 in. high, 20 in. wide. Pulley: 22x8½ in., 500 r. p. m.; mounted on crankshaft extension; belt speed 2,875 ft. per min. Two fuel tanks, 6 and 27 gals. K-W high tension magneto. Own governor. Kingston 2-in. double bowl carburetor. Cooling: Tubular radiator, thermo-syphon circulation, no fan. Spark plugs ½ in. standard. 5 rings to piston, width ⅜ in. Tractor dimensions: Length 176 in., width 90½ in., height 108 in.; shipping weight 12,500 lbs.

AVERY CO., PEORIA, ILL.
AVERY 40-80.



An 8 to 10-plow tractor with 2 drive wheels and 2 steering wheels; 40 h. p. on drawbar, 80 h. p. on belt, own rating; 2 speeds forward, 1¾ and 2¾ m. p. h.; recommended for 42-in. thresher; diameter turning circle 20½ ft. Motor: Own, 4 cylinders double horizontal opposed, valve in head, 7¾x8 in., 500 r. p. m.; recommended for kerosene, gasoline, distillate, etc. Circulating splash lubrication. Plain bearings throughout. Transmission: Avery sliding spur gears, open. Final drive: Spur gears and pinions, open. Drive wheels 87½ in. high, 24 in. wide. Pulley: 26x10 in., 500 r. p. m.; mounted on crankshaft extension; belt speed 3,400 ft. per min. 2 fuel tanks, 6¾ and 44 gals. K-W high tension magneto. Own governor. Kingston 2-in. double bowl carburetor. Cooling: Tubular radiator, thermo-syphon circulation, no fan. Spark plugs, ½ in. standard. 5 rings to piston, width ½ in. Tractor dimensions: Length 215 in., width 111½ in., height 121 in.; shipping weight 22,000 lbs.

BAILOR PLOW MFG. CO., ATCHISON, KAN.
BAILOR TWO-ROW MOTOR CULTIVATOR.

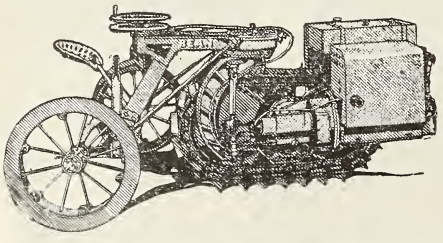


A tractor cultivator with 2 drive wheels and 1 steering wheel; 12 h. p. on drawbar; 2 speeds forward and reverse; diameter turning circle 7 ft. 6 in. Motor: Le Roi, L head, 4 cylinders vertical, 3⅛x4½ in., 1,000 r. p. m.; fuel recommended, gasoline. Lubrication: Internal pressure and circulating splash; oil recommended, Mobiloil A in summer and AA in winter. Bearings: Wheels, plain; rear axle and jackshaft, Hyatt roller. Transmission: Own make, enclosed gears, finished. Final drive: Open chain. Height of drive wheels 44 in., width 6 in. 2 compartment fuel tank, 6 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Le Roi governor. Byrne-Kingston 1-in. carburetor. Cooling: Perfex radiator, thermo-syphon circulation; Le Roi 17-in. fan; fan belt pulleys, 1¼x4 in.; flat belt, 1¼ in. by 3 ft. Champion spark plugs, ⅞ in. S. A. E. 3 rings to piston, 3⅛x3-16 in. Tractor dimensions: Length 8 ft. 6 in., width 8 ft., height 6 ft.; shipping weight 2,000 lbs.

BATES TRACTOR CO., LANSING, MICH.
BATES 15-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 25 h. p. on belt; recommended for 18 to 24-in. threshers; 3 speeds forward, 1½, 2½ and 6 m. p. h. Motor: Own, 4 cylinders vertical, valve in head, 4½x5½ in., 800 r. p. m.; recommended fuel, kerosene. Internal force feed lubrication. Bearings: Anti-friction or plain in wheels and jackshaft; balls in transmission. Transmission: Own enclosed gears, finished. Final drive: Bull pinions and gears, enclosed. Drive wheels 50 in. high, 14 in. wide. Pulleys: 10x8 in., 800 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 2,080 ft. per min. 2 fuel tanks, capacities 15 and 2 gals. Own water type air cleaner. Dixie magneto with impulse starter. Own governor. Own 1½-in. carburetor. Own radiator, pump circulation, no fan. Tungsten spark plugs, ½ in.; shipping weight 4,000 lbs.

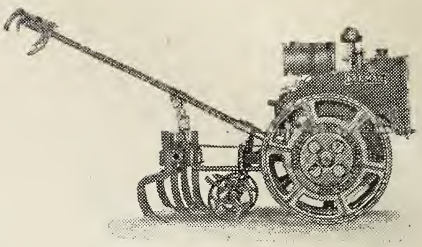
BEAN SPRAY PUMP CO., SAN JOSE, CAL.
BEAN TRACKPULL.



A general purpose and orchard tractor with 6 h. p. on drawbar and 10 h. p. on belt; 1 driving and steering track in front, 2 supporting wheels in rear; 1 speed change forward, 2 m. p. h.; 10 ft. turning circle. Motor: Le Roi, L head, 4 cylinders vertical, 3⅛x4½ in., 1,250 r. p. m. Fuel recommended, No. 1 distillate. Lubrication: Circulating splash. Bearings: Hyatt rollers in track; New Departure balls in transmission. Transmission: Enclosed gears, cut and hardened. Final drive: Enclosed spur pinion to internal ring gear driving track sprocket. Track 32 in. long on ground, 12 in. wide. Pulley: 12x5 in., 625 r. p. m.; belt speed 1,960 ft. per min. Donaldson air cleaner. Bosch magneto. Cooling: Perfex radiator, pump circulation. Tractor dimensions: Length 102 in., width 60 in., height 44 in.; shipping weight 3,200 lbs.

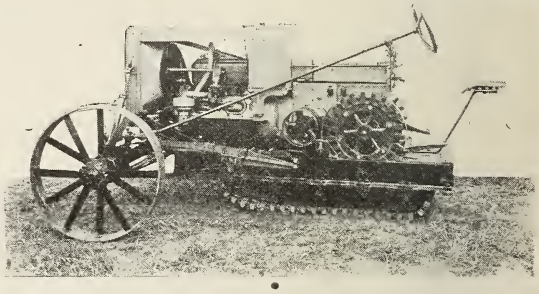
BEEMAN GARDEN TRACTOR CO., MINNEAPOLIS.
BEEMAN GARDEN TRACTOR.

A 2-wheel garden tractor guided by handles with a capacity for one 7-in. bottom; 1¼ h. p. on drawbar, 4 h. p. on belt; 360 lbs. pull at plowing speed, 1½ to 3½ m. p. h.; diameter turning circle 84½ in.; retail price Jan. 1, 1919, $285 f. o. b. factory. Motor: Own, 1 cylinder vertical, L head, 3½x4½ in., 800 r. p. m.; recommended for gasoline only. Splash lubrication, medium gas engine oil recommended. Plain bearings throughout. Transmission: Enclosed gears, finished. Final drive: Enclosed bull pinion and gear. Drive wheels 25 in. high,



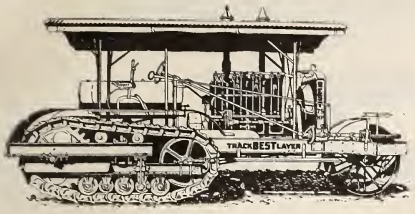
3½ in. wide. Pulley: 4½x4 in., 800 r. p. m.; mounted on crankshaft; belt speed 960 ft. per min. 1 fuel tank, 5 quarts. Donaldson dry air cleaner. Heinze magneto. Kingston ¾-in. carburetor. Cooling: S-J radiator, thermo-syphon circulation; 8-in. fan; pulleys 1 1-16 in. diameter, 2 in. wide; flat belt 21½ in. long, ¾ in. wide. Champion or Red Head spark plugs, ½ in. 3 rings to piston, 3½x¼ in. Tractor dimensions: Length 84½ in., width 17½ in., height 40 in.; shipping weight 657 lbs; 18½ cu. ft. packed for export.

BELTRAIL TRACTOR CO., ST. PAUL, MINN.



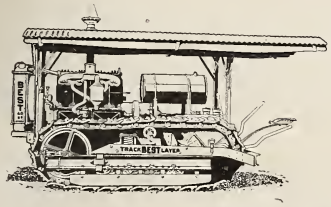
A 2 to 3-plow tractor with 1 drive track and 2 steering wheels; 12 h. p. on drawbar, 20 h. p, on belt; recommended for 28-in. thresher; 2,000 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3½ m. p. h.; diameter turning circle 18 ft. Motor: Waukesha, 4 cylinders vertical, valve in head, 3¾x5½ in., 950 r. p. m.; recommended fuel gasoline or distillate. Lubrication: Circulating splash. Bearings: Timken rollers in steering wheels; Hyatt rollers in tracks and transmission. Transmission: Enclosed gears, own make, finished. Final drive: Spur gear direct to track. Track 48 in. long on ground, 21 in. wide. Pulley: 10x6 in., 950 r. p. m.; driven through gears. 2 fuel tanks, 8 and 2 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Waukesha built-in governor. Ensign 1-in. carburetor. Cooling: Sparton radiator, pump circulation; Oakes 18-in. fan; fan pulleys 4½ in.; flat belt, 2½ in. wide. Splitdorf spark plugs, ⅞ in. S. A. E. Lateral adjustment of hitch 26 in., vertical 9 in. Tractor dimensions: Length 108 in., width 72 in., height 54 in.; shipping weight 4,500 lbs.; 150 cu. ft. packed for export. Distributors at Los Angeles and San Francisco, Cal.

C. L. BEST GAS TRACTION CO., OAKLAND, CAL.
BEST TRACKLAYER.



A 9 to 12-plow tractor with 2 tracklayers and one front wheel; 38 h. p. on drawbar, 78 h. p. on belt; thresher recommended, 42-in.; 2 speeds forward, 2⅜ and 1½ m. p. h.; diameter turning circle, 21 ft.; retail price f. o. b. factory Jan. 1, 1919, $5,850. Motor: Own make, valve in head, 4 cylinders vertical, 7¾x9 in., 435 r. p. m.; fuel recommended, distillate. Lubrication: McCord force feed oiler and splash; oil recommended, heavy for summer, light for winter. Plain babbitt bearings throughout. Transmission: Own make, gears enclosed, finished. Final drive: Bull pinion and gear, enclosed. Pulley: Size optional, driven through gears. 3 fuel tanks, 70 gals. distillate, 5 gals. gasoline, 5 gals. lubricating oil. Bennett centrifugal air cleaner. K-W high tension magneto with impulse starter. Governor: Own make fly ball. Ensign carburetor. Cooling: Own radiator, gear pump circulation; 28 in. fan. Tractor dimensions: Length 22 ft. 4 in., width 103 in., height 10 ft.; shipping weight 28,000 lbs. Branches in Los Angeles, Sacramento, Stockton and Colusa, Cal.; Denver, Colo.; Salt Lake City, Utah; Portland, Ore. Distributors in Honolulu, Peru, Chili, Mexico and Japan.

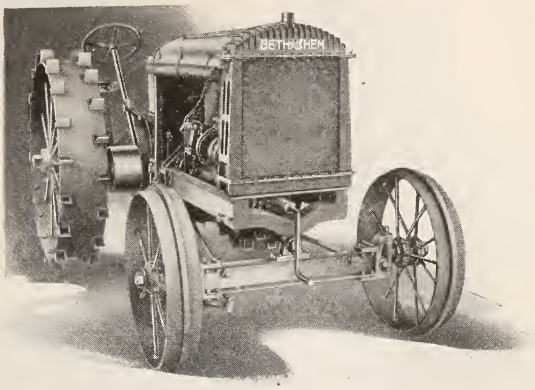
C. L. BEST GAS TRACTION CO., OAKLAND, CAL.
BEST TRACKLAYER.



A 6-plow tractor with 2 tracklayers; 21 h. p. on drawbar, 40 h. p. on belt; thresher recommended, 36-in.; 3,200 lbs. pull at plowing speed; 2 speeds forward, 2½ and 1¾ m. p. h.; diameter turning circle, 14 ft.; retail price f. o. b. factory Jan. 1, 1919, $4,100. Motor: Own make, valve in head, 4 cylinders vertical, 6¾x6¾ in., 600 r. p. m.; fuel recommended, distillate. Lubrication: Internal force feed and splash; oil recommended, high grade heavy for summer and light for winter. Bearings: Track wheels and transmission, plain; rear axle and cooling fan, Hyatt rollers. Transmission: Own make, gear, enclosed, finished. Final drive: Pinion and gear, enclosed. Pulley optional. 1 fuel tank, 30 gals. capacity. Bennett centrifugal air cleaner. K-W high tension magneto with impulse starter. Own governor. Ensign carburetor. Cooling: Own radiator, centrifugal pump circulation; 20-in. fan. Tractor dimensions: Length 129 in., width 77 in., height 56 in.; shipping weight 11,560 lbs.

BETHLEHEM MOTORS CO., ALLENTOWN, PA.
BETHLEHEM 18-36.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; 18 h. p. on drawbar, 36 h. p. on belt; 3,100 lbs. pull at plowing speed; 2 speeds forward, 1.8 and 3.3 m. p. h.; recommended for 28-in. thresher; diameter turning circle 25 ft. Motor: Valve in head, 4 cylinders vertical, 4¾x6 in., 900 r. p. m.; recommended for kerosene. Hyatt roller bearings throughout. Transmission: Enclosed gears, finished. Final drive: Enclosed spur gears to live axle, cushioned driving spiders in wheels.



Drive wheels 54 in. high, 12 in. wide. Pulley: 10x7½ in., 1,278 r. p. m.; belt speed 3,320 ft. per min. 2 fuel tanks, 4 and 14 gals. Bennett Centrifugal air cleaner. Bosch magneto. Stromberg carburetor. Cooling: Cellular radiator, pump circulation. Tractor Dimensions: Length 144 in., width 73 in., height 67 in.; shipping weight 6,200 lbs.

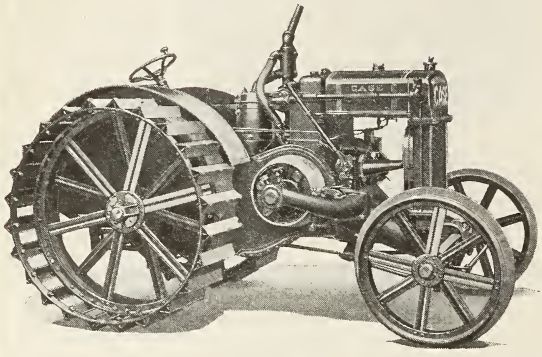
BORING TRACTOR CORP., ROCKFORD, ILL.
BORING.

A 2-plow (16-in. bottoms) tractor with 2 drive wheels in front and 1 supporting wheel in rear; 20 h. p. on belt; recommended for 22-in. separator; 2 speeds forward, 1½ to 4 m. p. h.; diameter turning circle, 14 ft.; retail price Jan. 1, 1919, $1,485, f. o. b. factory. Motor: Waukesha, 4 cylinders vertical, L head, 4¼x5¾ in., 1,000 r. p. m.; recommended for kerosene or gasoline. Lubrication: Circulating splash and pressure; heavy oil in summer, medium in winter. Bearings: Hyatt rollers in drive wheels, rear axle, transmission and jackshaft; Hyatt and Timken in real wheel; balls in fan. Own transmission, enclosed gears, finished. Final drive: Enclosed chain. Drive wheels 54 in. high, 10 in. wide. Pulley: Size optional, operating one-half motor speed; controlled by motor clutch; driven through gears. 1 fuel tank, 20 gals. Bennett centrifugal air cleaner. Kingston magneto with impulse starter. Waukesha built-in governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes 20-in. fan; pulleys 6 and 2 in. diameter; flat belt 29 in. long, 1½ in. wide. A. C. Spark plugs, ⅞ in. S. A. E. 4 rings to pistons, 4¼x¼ in. Tractor dimensions: Length 144 in., width 74 in. frame closed, 104 in. frame extended; height 74 in.; shipping weight 4,000 lbs. Special feature: High clearance under frame permits straddling row crops for cultivating; adjustable frame to cover one or two rows.

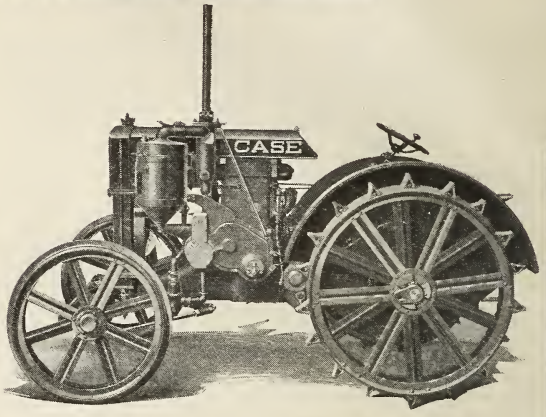
BUCKEYE MFG. CO., ANDERSON, IND.
TRUNDAAR.

A 3-plow tracklayer tractor; 20 h. p. on drawbar, 30 h. p. on belt; 4,000 lbs. pull at plowing speed; 2 speeds forward, 1½ and 2½ m. p. h.; diameter turning circle, 10 ft. Motor: Waukesha, L head, 4 cylinders vertical, 4¾x6¾ in., 900 r. p. m.; fuels recommended, distillate or gasoline. Lubrication: Circulating splash; oil recommended, Monogram heavy for both winter and summer. Transmission: Gears, enclosed and finished. Final

CASE



Case 15-27 Kerosene Tractor



Case 10-18 Kerosene Tractor

CASE TRACTORS STAND UP UNDER CONTINUOUS HARD WORK

THOUSANDS of Case tractors built and sold years ago are giving their owners good, faithful and economical service. This ability to stand the hard knocks is what counts. Paint is not power. This sturdiness and durability didn't just happen. It is a part of a well thought out plan. It is part of the Case Idea—Careful designing.

From the beginning (and that was in 1842), CASE has stood for dependability, service and economy in our products. Only sound ideas from experienced engineers and proven by practical demonstrations and successful performance are permitted to enter into the construction of Case kerosene tractors. Case never built a cheap tractor, nor will we ever try to compromise performance for the sake of price.

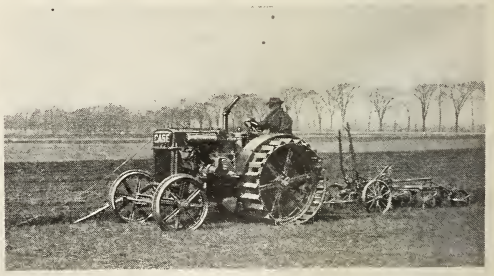
The two tractors shown on this page are the two smaller of the Case line of kerosene tractors. They embody all of those worth-while features which insure performance, convenience, durability and economy in a tractor.

The 10-18 is an ideal two-plow tractor, while the 15-27 is recommended for three plows. Both have liberal reserve power and burn kerosene economically. Thermostatic control of the cooling system is a Case feature that is incorporated into both of these tractors. The Case air washer keeps dust out of motor. The all cut steel, enclosed, spur gears and roller bearings conserve power. The 4-cylinder engine with governor offers steady power for belt work.

Write Today for Free Literature

Your knowledge of tractors will not be complete until you know all about Case kerosene tractors, of which there are four sizes, the 10-18 H. P., 10-20 H. P., 15-27 H. P., and 20-40 H. P., in fact, a size for any farm. Write now for this literature. It is free and will be sent gladly upon request. You owe it to yourself.

Case 10-18 Kerosene Tractor Plowing Two 14" Furrows



Case 15-27 Kerosene Tractor Plowing Three 14" Furrows

J. I. Case Threshing Machine Co., Inc.

Racine **Established 1842** **Wisconsin, U. S. A.**

drive: Live axle, enclosed. Traction: 2 tracklayers, 76 in. long on ground, 15 in wide. Pulley: 10x8 in., 900 r. p. m.; controlled through motor clutch; belt speed, 2,300 ft. per min. 1 fuel tank, 30 gals. Bennett air cleaner. Bosch magneto with impulse starter. Waukesha governor. Ensign carburetor, 1½-in. Perfex radiator, pump circulation; fan 20 in. spark plugs, ⅞ in. 3 rings to piston, 4¾x¼ in.

BULL TRACTOR CO., MINNEAPOLIS, MINN. BULL.

A 2 to 3-plow tractor with 1 driving wheel running in the furrow, 1 steering and 1 supporting wheel; 12 h. p. on drawbar, 24 h. p. on belt; recommended for 26-in. thresher; 2,000 lbs. pull at plowing speed; 1 speed change forward; diameter turning circle 13 ft. left and 18 ft. right; retail price f. o. b. factory Jan. 1, 1919, $1,075. Motor: Toro, L head, 2 cylinders opposed, 5½x7 in., 750 r. p. m.; fuel recommended, gasoline, kerosene or distillate. Lubrication: Internal force feed through hollow crank; oil recommended, Gargoyle, Mobiloil B in summer and A in winter. Bearings: Front wheels, cast iron, one piece; rear axle, Hyatt roller; cooling fan, brass. Final drive: Spur gear, open. Height of drive wheel 6 ft., width 14 in. Pulley: 12x 6½ in., 750 r. p. m.; controlled direct from motor; belt speed 2,357 ft. per min. 2 fuel tanks, 3½ and 18½ gals. Donaldson air cleaner. K-W magneto with impulse starter. Fly ball governor, enclosed. Kingston 1½-in. carburetor. Cooling: Own radiator, pump circulation; own fan; flat belt 9 ft. 4 in. long and 1¼ in. wide. Spark plugs: ½ in. standard. Hitch: Lateral adjustment, 20 in., vertical 8 in. Tractor dimensions: Length 163 in., width 78 in., height 78 in.; shipping weight 4,996 lbs.; 271 cu. ft. packed for export.

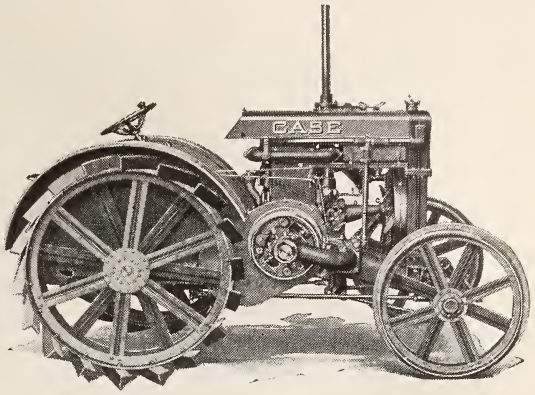
BULLOCK TRACTOR CO., CHICAGO, ILL. CREEPING GRIP 15-25.

A 3 to 4-plow tractor driving and steering through two tracks; 15 h. p. on drawbar, 25 h. p. on belt; 3,000 lbs. pull at plowing speed; recommended for 32-in. thresher; 1 speed change forward, 2½ m. p. h.; turns in own length. Motor: Waukesha, 4 cylinders vertical, 4¾x6¾ in., 900 r. p. m.; recommended for gasoline, kerosene or distillate. Circulating splash lubrication. Plain bearings. Final drive, open chain. Oscillating tracks swung from center of frame, manganese steel shoes and pins, 8 sq. ft. bearing surface. Pulley: 12x8 in., 600 r. p. m.; driven through gears; belt speed 1,885 ft. per min. Fuel capacity 17½ gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Built-in governor. Bennett 1½-in. carburetor. Cooling: Modine radiator, pump circulation, water capacity 15 gals. ⅞-in. spark plugs. Tractor dimensions: Length 9 ft., width 6 ft. 9 in., height 5 ft. 7 in.; weight 7,200 lbs.

CAMERON MOTORS CORP., STAMFORD, CONN. CAMERON.

A 3 or 4-plow tractor with 2 drive wheels and 2 steering wheels; 3 speeds forward; retail price Jan. 1, 1919, $950 f. o. b. factory. Motor: Own, 4 cylinders vertical, 4⅜x6 in., 900 r. p. m.; recommended for kerosene or gasoline. Force feed and splash lubrication. Annular ball bearings. Transmission: Enclosed gears, finished. Final drive: Enclosed gears to rear wheels. Wheels 42 in. high, 12 in. wide. Pulley: 12x6 in. Ignition: Generator and storage battery, ⅞ in. spark plugs. Cooling: Sectional radiator, pump circulation, fan. Tractor dimensions: Length 120 in., width 56 in., height 54 in.; weight 3,000 lbs.

J. I. CASE THRESHING MACHINE CO., RACINE, WIS. CASE 10-18.



A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; 2,000 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3½ m. p. h.; diameter turning circle 22 ft.; recommended for 20-in. thresher; retail price f. o. b. factory Jan. 1, 1919, $1,200. Motor: Own make, valve in head, 4 cylinders vertical, 3⅞x5 in., 1,050 r. p. m.; fuel recommended, kerosene, distillate or gasoline. Circulating splash lubrication; oil recommended, medium or heavy in summer and light in winter. Bearings: Front wheels, plain; rear axle, transmission and jackshaft, Hyatt roller; cooling fan, Fafnir ball. Transmission: Own make, spur gears, enclosed, all finished. Final drive: Live axle, bull pinion and gear, enclosed. Height of drive wheels 42 in., width 9 in. Pulley: 14¼x5¼ in., 1,050 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 3,900 ft. per min. 2 fuel tanks, 2 and 10½ gals. Air cleaner: Own make, washer type. Kingston high tension magneto with impulse starter. Own fly ball governor. Kingston 1⅛-in. carburetor. Cooling: Own radiator, pump and thermostatic regulator; 17-in. fan; spiral gear driven with friction safety hub gears enclosed. A-C Titan spark plugs, ⅞ in. S. A. E. 3 rings to piston, 3⅞x3-16 in. Hitch: Lateral adjustment 14½ in. Tractor dimensions: Length 8 ft. 5½ in., width 4 ft. 8 in., height 4 ft. 6½ in.; shipping weight 3,400 lbs.; 204 cu. ft. packed for export. Branches and distributing points: San Francisco, Cal.; Denver, Colo.; Chicago, Peoria and Freeport, Ill.; Indianapolis, Ind.; Des Moines, Sioux City, Mason City and Waterloo, Ia.; Great Bend and Wichita, Kan.; Louisville and Lexington, Ky.; Lansing, Mich.; Minneapolis, Mankato and Fergus Falls, Minn.; Kansas City and St. Louis, Mo.; Billings, Great Falls, Lewistown and Glasgow, Mont.; Lincoln, Neb.; Fargo, Dickinson, Beach, Bismarck, Williston, Minot, Devil's Lake and Grand Forks, N. D.; Syracuse, N. Y.; Columbus, O.; Oklahoma City and Enid, Okla.; Portland, Ore.; Harrisburg, Pa.; Aberdeen, Sioux Falls, Watertown and Lemmon, S. D.; Nashville, Tenn.; Amarillo and Dallas, Tex.; Salt Lake City, Utah; Spokane, Wash.; Madison and Oshkosh, Wis.; Calgary and Edmonton, Alta.; Winnipeg and Brandon, Man.; Regina and Saskatoon, Sask.; Odessa, Russia; Buenos Aires, Rosario and Bahia Blanca, Argentina; Montevideo, Uruguay; Paris, France.

J. I. CASE THRESHING MACHINE CO., RACINE, WIS. CASE 10-20.

A 3-plow tractor with 2 drive wheels and 1 steering wheel; 2,650 lbs. pull at plowing speed; one speed change forward, 2¼ m. p. h.; diameter turning circle 23 ft.; recommended for 20-in. thresher. Motor: Own make, valve in head, 4 cylinders vertical, 4¼x6 in., 900 r. p. m.; fuel recommended, kerosene, distillate or gasoline. Circu-

COES

KEY MODEL WRENCH

For sizes above the reach of small tools

SIMPLE,
STRONG,
RELIABLE,

28 inches—36 inches—48 inches long

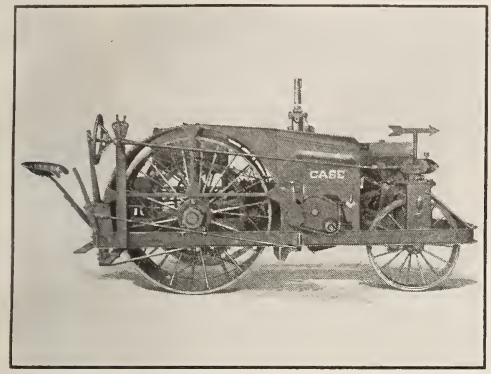
28 inch opens 5¼ inches
36 inch opens 6⅛ inches
48 inch opens 9⅜ inches

From your nearest Jobber or write

Coes Wrench Company

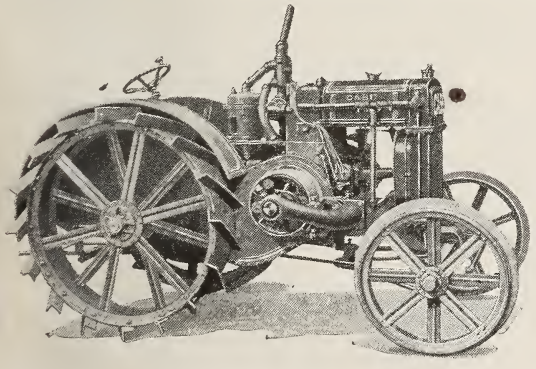
Worcester, Massachusetts

lating splash lubrication; oil recommended, medium or heavy in summer and light in winter. Bearings: Front wheel, transmission and cooling fan, plain; rear axle, Hyatt roller; jackshaft, Hyatt roller and plain. Transmission: Own make, enclosed gears, finished. Final drive: Live axle, open bull pinion and gear. Height of drive wheels 52 in., width 22 in. and 10 in. Pulley: 17x6½ in., 900 r. p. m.; controlled by motor clutch, mounted on crankshaft; belt speed 4,000 ft. per min. 2



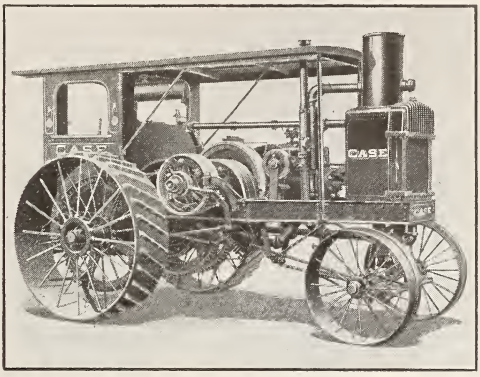
fuel tanks, 2¾ and 20 gals. Donaldson centrifugal air cleaner. Kingston magneto with impulse starter. Own governor. Kingston 1¼-in. carburetor. Cooling: Own radiator, pump circulation; own 19¾-in. fan; diameter and width of fan belt pulleys, 8 and 3¾x2⅜ in.; flat belt, 2 in. wide, 5 ft. 7 in. long. A-C Titan spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4¼x3-16 in. Hitch: Lateral adjustment 29 in. Tractor dimensions: Length 150 in., width 67 in., height 60 in.; shipping weight 5,080 lbs.; 414 cu. ft. packed for export.

J. I. CASE THRESHING MACHINE CO., RACINE, WIS. CASE 15-27.



A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 3,600 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3½ m. p. h.; diameter turning circle 27 ft.; recommended for 26-in. thresher; retail price f. o. b. factory Jan. 1, 1919, $1,600. Motor: Own make, valve in head, 4 cylinders vertical, 4½x6 in., 900 r. p. m.; fuel recommended, kerosene, distillate or gasoline. Circulating splash lubrication; oil recommended, medium or heavy in summer and light in winter. Bearings: Front wheels, plain; rear axle, transmission and jackshaft, Hyatt roller; cooling fan, Fafnir ball. Transmission: Own make, enclosed gears, finished. Final drive: Live axle, enclosed bull pinion and gear. Height of drive wheels 52 in., width 12 in. Pulley: 16x6½ in., 900 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 3,760 ft. per min. 2 fuel tanks, 2¾ and 20 gals. Air cleaner: Own make, washer type. Kingston magneto with impulse starter. Own fly ball governor. Kingston 1⅜-in. carburetor. Cooling: Own radiator, pump circulation; 19½ in. fan, driven through helical gears, friction hub on fan absorbs shocks due to starting, etc. A-C Titan spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4½x3-16 in. Hitch: Lateral adjustment 29 in. Tractor dimensions: Length 126 in., width 72 in., height 68 in.; shipping weight 5,500 lbs.; 318 cu. ft. packed for export.

J. I. CASE THRESHING MACHINE CO., RACINE, WIS. CASE 20-40.



A 5 to 6-plow tractor with 2 drive wheels and 2 steering wheels; 4,200 lbs. pull at plowing speed; 2 speeds forward, 2 and 3 m. p. h.; diameter turning circle 41 ft.; recommended for 32-in. thresher; retail price f. o. b. factory Jan. 1, 1919, $3,000. Motor: Own make, valve in head, 2 cylinders opposed, 8¾x9 in., 475 r. p. m.; fuel recommended, kerosene, distillate or gasoline. Lubrication: Madison-Kipp mechanical oiler; oil recommended, medium or heavy in summer and light in winter. Bearings: Plain throughout, except cooling fan, which has Hyatt rollers. Transmission: Own make open gear, rough. Final drive: Open bull pinion and gear. Height of drive wheels 66 in., width 20 in. Pulley: 24x8½ in., 475 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 2,980 ft. per min. 2 fuel tanks, 11 and 26 gals. K-W magneto with impulse starter. Own governor. Kingston 2½-in. carburetor. Cooling: Own radiator, thermo-syphon circulation; 24½-in. fan; friction driven. Kingston spark plugs, ¾ in. pipe thread. 4 rings to piston, 8¾x⅜ in. Hitch: Lateral adjustment 38 in. Tractor dimensions: Length 177 in., width 100 in., height 107 in.; shipping weight 13,700 lbs.; 612 cu. ft. packed for export.

CHAMPION TRACTOR CO., ARGO, ILL. CHAMPION 15-30.

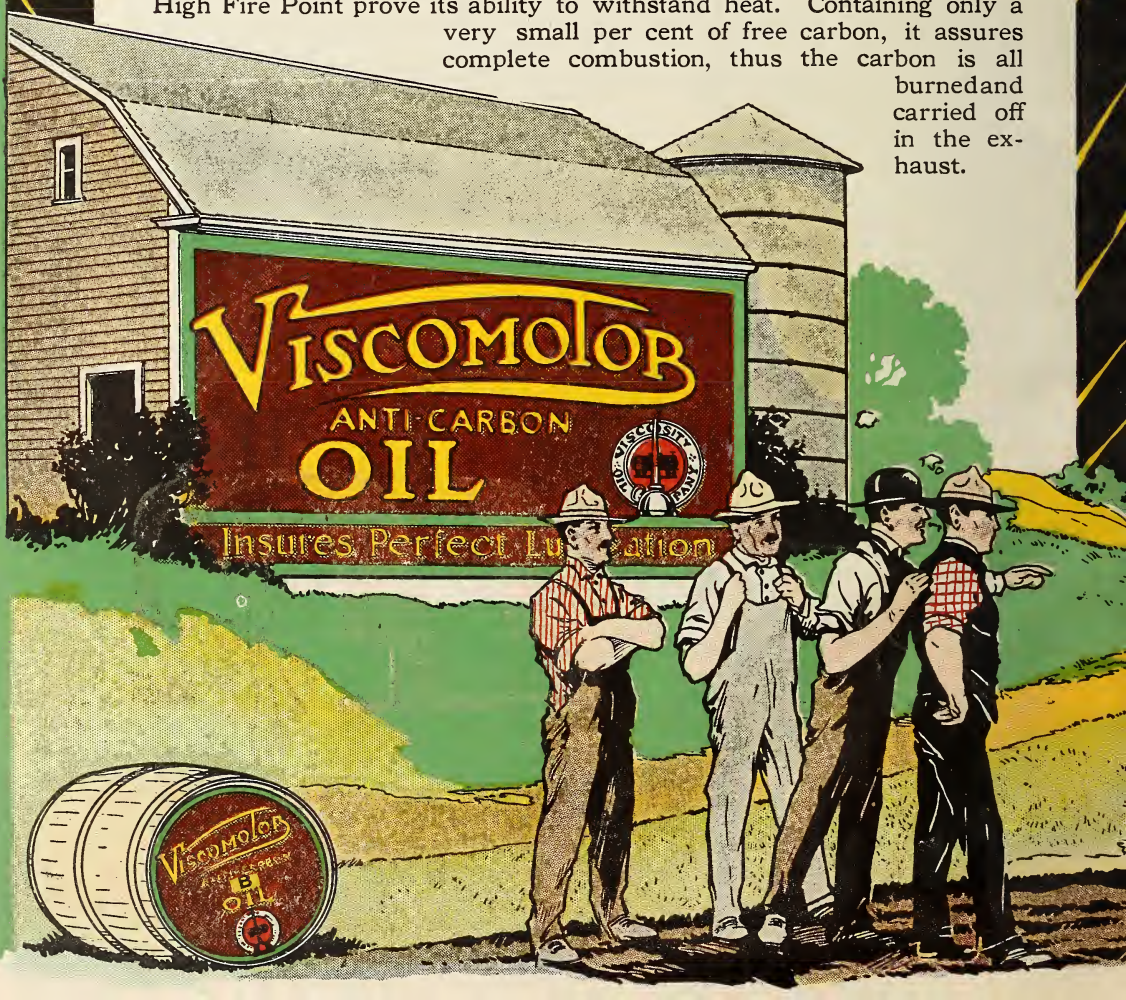
A 3-plow tractor with 2 drive wheels and 2 steering wheels; 14 h. p. constant, 17½ h. p. maximum on drawbar, 29 h. p. on belt; 2,750 lbs. pull at plowing speed; 3 speeds forward, 1½, 2½ and 4¼ m. p. h., direct on second; recommended for 24-in. thresher; retail price Jan. 1, 1919, $1,465 f. o. b. factory. Motor: Buda, L head, 4 cylinders vertical, 4¼x5½ in., 1,000 r. p. m.; recommended for gasoline or kerosene. Full pressure lubrication. Bearings: Annular balls in transmission and worm; Hyatt and balls in rear axle. Transmission: Enclosed sliding gears, alloy steel, drop forged, cut and hardened. Final drive: Initial reduction, worm and gear; final reduction, enclosed internal gears on hubs. Drive wheels 48 in. high, 12 in. wide, 30 lugs per wheel. Pulley: 12x6 in., 850 r. p. m., located on right side;

100 Per Cent Tractor Lubrication

Efficient lubricating oil is as necessary to the tractor as the tractor is to the farm. And tractor lubrication—to be truly efficient—can only be obtained by using oil that is compounded especially for tractor use.

100 per cent tractor lubricating oil must keep a constant, even and indestructible film of oil between wearing surfaces, under tremendous heat—be able to withstand a maximum degree of fire and burn clean, leaving the least possible carbon when consumed.

VISCOMOTOR OIL—"A" and "B"—was developed especially for tractor lubrication. Being compounded of the very best crude it retains its viscosity under the greatest heat. High Flash and High Fire Point prove its ability to withstand heat. Containing only a very small per cent of free carbon, it assures complete combustion, thus the carbon is all burned and carried off in the exhaust.

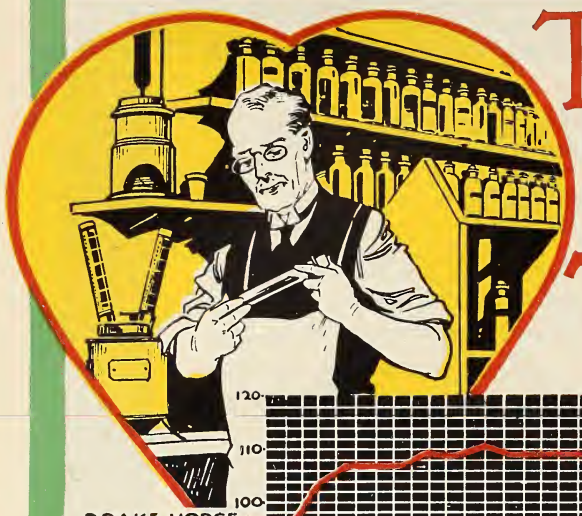


Tests Prove Viscomotor Superiority

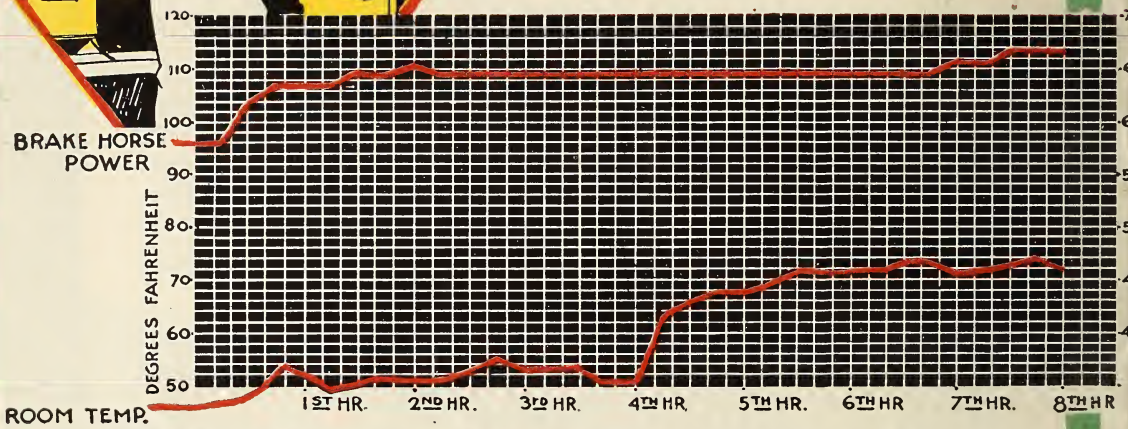
Careful laboratory experiments, like the one given in detail on the next page—exhaustive field tests, under every working condition, have proved to the tractor manufacturer that the use of VISCOMOTOR OIL—"A" or "B"—will give the desired lubrication, so necessary to continual, economical tractor service.

That's why the best tractor manufacturers recommend, and urge, the use of VISCOMOTOR OIL—and why it is so common for tractor owners to say VISCOMOTOR when they want oil. They have learned that VISCOMOTOR OIL lubricates the hot cylinder walls and crank bearings—maintaining a constant film of oil—protecting the metal surfaces from friction and wear.

VISCOMOTOR OIL, providing as it does the necessary seal between cylinder wall and piston rings, makes possible the utilization of every atom of power from ignited gas, often giving a much higher horse-power than originally rated by the manufacturer. An example of this added horse-power is shown in the following test.



THE HEART OF THE TRACTOR



Added Power from Viscomotor Oil

On January 31st, 1919, the Minneapolis Steel and Machinery Company, one of the largest tractor builders in the country, tested VISCOMOTOR OIL in a kerosine burning "Twin City" 65 horse-power tractor engine, of their manufacture. The chart above was photographed from the dynamometer test sheet and is self explanatory.

6½ gallons of VISCOMOTOR OIL was put into the crank case and the engine started at a speed of 500 R. P. M. The first half hour the engine developed only 58 h. p., owing to a window being left open chilling the motor. Thermometer reading 47° F. In the next 30 minutes the motor warmed up and developed 62 h. p.

At the end of the second hour, with room temperature about 50° F. the engine developed a little better than 65 h. p. and maintained that rate until toward the end of the sixth hour, when, without added speed, the dynamometer registered another steady power gain, and at the end of the eighth hour shows 67 h. p. or 2 h. p. over motor rating.

A careful examination after this eight hour test showed the cylinder walls and pistons highly polished and coated with a thin film of oil or "enamel" which results from metal parts becoming thoroughly saturated with oil, which is idealistic of perfect lubrication. Engine consumed but ½ gallon of lubricating oil in the entire run and kept the engine cool, averaging 148° F. for outgoing water.

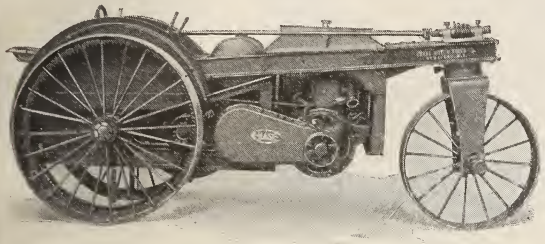
This is not a spectacular stunt, but a characteristic of VISCOMOTOR OIL performance, and conclusive proof of VISCOMOTOR OIL superiority.

VISCOSITY OIL COMPANY
CHICAGO, U. S. A.

driven through gears; belt speed 2,600 ft. per min. Fuel capacity 26½ gals. Enclosed dry air cleaner. Dixie magneto with impulse starter. Pierce governor. Carter 1¼-in. carburetor. Cooling: Cellular radiator, removable cast iron shell, pump circulation; water capacity 7½ gals.; 20-in. Hy-Duty fan; 2-in. laminated and adjustable belt. 3 ¼-in. rings to piston. Vertical hitch adjustment from 13¼ to 18¼ in. Minimum clearance 12 in. Tractor dimensions: Length 130 in., wheel base 80½ in., width 70 in.; net weight 3,190 lbs.

CHASE MOTOR TRUCK CO., SYRACUSE, N. Y.

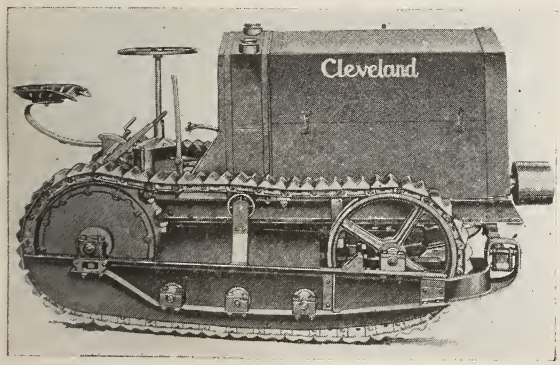
CHASE 9-18.



A 2-plow (14 in.) or 3-plow (12 in.) tractor with 2 drive wheels and 1 steering wheel; 9 h. p. on drawbar, 18 h. p. on belt; 2 speeds forward, 1½ and 2½ m. p. h.; turns in its length by locking one wheel. Motor: Buda, 4 cylinders vertical, 3¾x5½ in., 900 r. p. m.; recommended for gasoline, distillate or kerosene Circulating splash lubrication. Hyatt roller bearings in transmission. Transmission: Enclosed spur gears, cut and hardened. Final drive: Open bull pinions and gears, individual clutches to each wheel. Drive wheels 48 in. high, 12 in. wide. Pulley: 8x6 in., 900 r. p. m.; mounted on crankshaft extension; belt speed 1,890 ft. per min. 2 fuel tanks, 2 and 11 gals. Centrifugal air cleaner. High tension magneto with impulse starter. Tractor dimensions: Length 11½ ft., width 68 in., height 57 in.; shipping weight 4,700 lbs.

CLEVELAND TRACTOR CO., CLEVELAND, O.

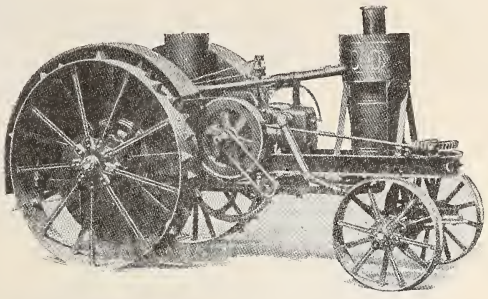
CLEVELAND 12-20.



A 2-plow tractor with 2 driving and steering tracks; 1,500 lbs. pull at 3½ m. p. h.; recommended for 24-in. thresher; diameter turning circle 12 ft.; retail price Jan. 1, 1919, $1,585, f. o. b. factory. Motor: Weidely, 4 cylinders vertical, valve-in-head, 3¾x5½ in., 1,200 r. p. m.; recommended fuels, kerosene, gasoline or distillate. Lubrication: Internal force feed; recommended oil, Mobiloil B in summer, A in winter, or equivalent. Bearings: Timken roller in front and rear wheels; ball and roller in transmission. Transmission: Own gears, enclosed and finished. Final drive: Internal gear. Tracks 50 in. on ground, 6⅝ in. wide. Pulley: 8x6 in., 1,200 r. p. m.; mounted on crankshaft; no clutch control; belt speed 2,500 ft. per min. 2 compartment fuel tank, 1 and 12 gals. Own air cleaner. Teagle magneto with impulse starter. Own governor. Kingston 1⅛-in. carburetor. Cooling: McCord radiator, pump circulation; Oakes 18-in. fan, flat belt. Spark plugs ⅞ in. S. A. E. 3 rings to pistons, ¼ in. wide. Tractor dimensions: Length 96 in., width 50 in., height 52 in.; domestic shipping weight 3,175 lbs.; packed for export, 88x54x53 in., 145.7 cu. ft.

C. O. D. TRACTOR CO., MINNEAPOLIS, MINN.

C. O. D. 13-25.

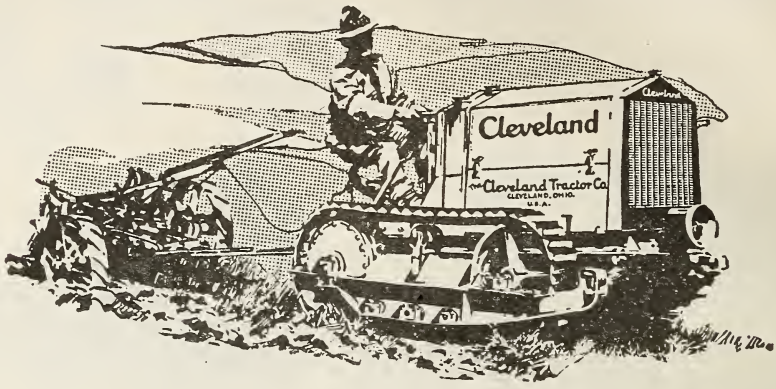


A 3-plow tractor with 2 drive wheels and 2 steering wheels; 13 h. p. on drawbar, 25 h. p. on belt; 2,600 lbs. pull at plowing speed, 2½ m. p. h.; operating weight 6,500 lbs.; turning circle 22 ft. Motor: Own, L head, 2 cylinders, opposed, 6½x7 in.; 550 r. p. m.; recommended fuel, kerosene. Lubrication: Detroit force feed oiler. Plain bearings throughout. Transmission: Open gears, 1 speed forward. Final drive: Live axle, open bull gear and spur pinion to wheels. Diameter of rear axle 2 15-16 in. Drive wheels: 70 in. high, 12 in. wide. Pulley: 18x8 in., 550 r. p. m.; controlled through motor clutch; driven direct from motor; belt speed 2,750 ft. per min. 2 fuel tanks, 18 and 5 gals. Oil capacity 1¼ gals. Ignition: Atwater-Kent and K-W magneto. Carburetor: Kingston, single bowl, 1½ in. inlet; mixture heated. Cooling: Water, S-J radiator, pump circulation. Spark plugs, ½ in. Hitch: 20 in. high; lateral adjustment 24 in.; vertical adjustment 6 in. Frame mounted solid. Dimensions: Length over all 156 in., width 78 in., height 76 in.; wheel base 108 in.; shipping weight 6,500 lbs.

COLEMAN TRACTOR CORP., KANSAS CITY, MO.

COLEMAN 16-30.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 30 h. p. on belt; 2,000 to 3,000 lbs. pull at plowing speed, 2.6 to 3 m. p. h.; recommended for 24 to 28-in. thresher; diameter turning circle 10 ft.; retail price Jan. 1, 1919, $1,750, f. o. b. factory. Motor: Climax, 4 cylinders vertical, L head, 5x6½ in., 750 r. p. m.; recommended for gasoline or kerosene. Lubrication: Internal force feed; Mobiloil B recommended, summer and winter. Bearings: Own in wheels; Hyatt and Timken rollers in transmission; Timken in jackshaft. Transmission: Own gears, enclosed and finished. Final drive: Worm. Drive wheels 46 in. high, 10 in. wide. Pulley: 14x7 in.; belt speed 2,300 ft. per min. 2 fuel tanks, 17 and 3 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Climax built-in governor. Stromberg carburetor. Cooling: Modine radiator, pump circulation; Oakes fan, flat belt. Champion spark plugs. Tractor dimensions: Length 10 ft.. 6 in., width 66 in., height 60 in.; shipping weight 4,925 lbs.



The Cleveland Tractor

THE Cleveland Tractor is destined to revolutionize agriculture throughout the world. This wonderful machine is capable of performing an almost endless variety of work on the farms and in industrial plants.

It pulls two 14-inch bottoms at 3½ miles per hour—8 to 10 acres per day in medium soil.

It is of staunch, sturdy build, carrying and laying its own tracks like the great tanks which have accomplished such wonders on the battlefields of Europe.

Its weight is only 3300 pounds and with its 600 square inches of traction surface, its bearing pressure on the ground is a little more than five pounds to the square inch. It does not mire nor pack the soil, and it can go almost anywhere.

It is only 96 inches long and can turn in a twelve-foot circle. Its small size enables it to be used in places where larger machines cannot go.

It develops twelve horsepower at the drawbar and twenty at the belt pulley.

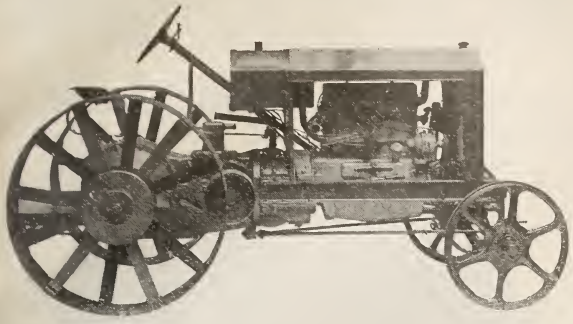
It is easy to handle and to steer and economical to operate.

The Cleveland Tractor was designed by Rollin H. White, the famous automotive engineer, a fact which in itself is assurance of its quality and its merit.

THE CLEVELAND TRACTOR COMPANY

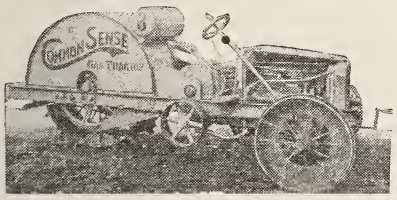
CLEVELAND, OHIO, U. S. A.

COMET AUTOMOBILE CO., DECATUR, ILL.
COMET.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; 2 speeds forward, 3 to 5 m. p. h. Motor: Erd, valve in head, 4 cylinders vertical, 4x6 in., 800 r. p. m.; fuel recommended, gasoline. Circulating splash lubrication. Transmission: Foote, enclosed gears, finished. Final drive: Live axle type, pinions and gears enclosed. Height of drive wheels 54 in., width 12 in. Pulley: 15¾x7½ in.; controlled through motor clutch, driven through gears. 1 fuel tank, 20 gals. Orem air cleaner. Dixie magneto with impulse starter. Erd governor. Kingston 1½-in. carburetor. Champion spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4x¼ in. Tractor dimensions: Wheel base 88½ in., width 5 ft. 7½ in., height 5 ft.; shipping weight 4,500 lbs.

COMMON SENSE GAS TRACTOR CO., MINNEAPOLIS.
COMMON SENSE 8.

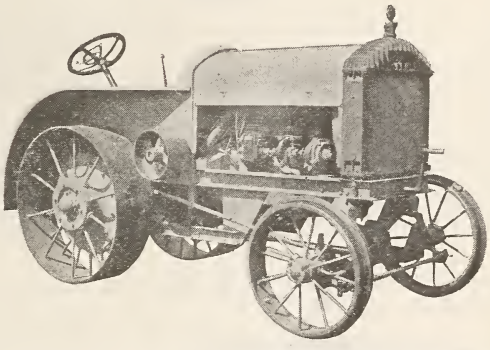


A 4-plow tractor with 1 drive wheel and 2 steering wheels; 20 h. p. on drawbar, 40 h. p. on belt; 3,000 lbs. pull at plowing speed; recommended for 32 in. thresher; turning circle 32 ft.; retail price $2,200 f. o. b. factory. Motor: Herschell-Spillman, 8 cylinders, L head, V type, 3¼x5 in., 1,100 r. p. m.; recommended fuel, gasoline. Lubrication: Pressure. Bearings: Hyatt rollers in transmission, balance plain. Transmission: Enclosed cut gears, 2 speeds forward, 2½ and 3½ m. p. h.. Final drive: Double roller chain. Rear axle diameter 3 3-16 in. Drive wheel 62 in. high, 24 in. wide. Pulley: 22x8 in., 400 r. p. m.; controlled by motor clutch; driven through transmission; belt speed 2,300 ft. per minute. Fuel capacity 37 gals. Own air cleaner. Ignition: K-W high tension magneto, with impulse starter. Pickering governor. Carburetor: Kingston 1¼ in. Cooling: Water, Todd honeycomb radiator, pump circulation, Oakes 20-in. fan. Champion ⅞ in. spark plugs. Hitch: 18 in. high; lateral adjustment 27 in., vertical 10 in. Frame mounted solid. Dimensions: Length over all 179 in., width 90 in., height 71 in.; wheel base 108 in.; shipping weight 6,000 lbs.

CRAIG TRACTOR CO., CLEVELAND, O.
CRAIG 15-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 25 h. p. on belt; recommended for 26-in. thresher; 3,200 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 4 m. p. h.; diameter turning circle 30 ft. Motor: Beaver, 4 cylinders vertical, valve in head, 4¾x6 in., 950 r. p. m.; recommended fuel, kerosene. Lubrication: Force feed to crankshaft, splash to pistons and cylinders; recommended oil, Havoline. Bearings: Timken roller in front wheels, rear axle and transmission: Hyatt roller in fan. Transmission: Craig enclosed gears, finished. Final drive: Enclosed spur gears to live axle. Drive wheels 48 in. high, 12 in. wide. Pulley: 11x8 in., 950 r. p. m.; controlled by independent friction clutch; driven through bevel gears; belt speed 2,735 ft. per min. 2 fuel tanks, 24 and 3 gals. Own air cleaner, water filter type. Berling magneto with impulse starter. Pharo governor. Stromberg 1½-in. carburetor. Cooling; Spirex radiator, pump circulation; "Hy Duty" 20-in. fan; pulleys 3x1¾ and 7x1¾; flat fan belt 1⅝ in. wide. 4 rings to pistons, 4¾x¼ in. Lateral hitch adjustment 11 in., vertical 6 in. Tractor dimensions: Length 128 in., width 70 in., height 65 in.; shipping weight 5,000 lbs.

DART TRUCK & TRACTOR CORP., WATERLOO, IA.
DART BLUE J 15-30.

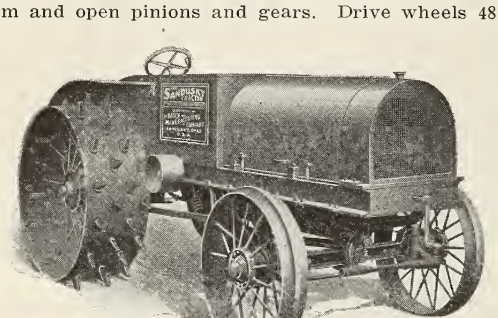


A 3-plow tractor with 2 driving and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; recommended for 26-in. thresher; 3,000 lbs. pull at plowing speed;3 speeds forward, 1¼, 2½ and 6 m. p. h.; diameter turning circle, 20 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,750. Motor: Buda, L head, 4 cylinders vertical, 4¼x5½ in., 1,050 r. p. m.; fuel recommended, gasoline or kerosene. Full pressure lubrication; oil recommended, Mobiloil B. Bearings: Front wheels, Timken roller; rear wheels and rear axle, Gurney ball; transmission and jackshaft, ball; cooling fan, Hyatt roller. Transmission: Own gears, enclosed, finished. Final drive: Enclosed double reduction worm and bull wheel. Drive wheels 40 in. high, 12 in. wide. Pulley: 12x7 in., 750 r. p. m.; controlled through motor clutch; driven through gears. One fuel tank, 25 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Pierce governor. Zenith carburetor, 1¼ in. Cooling: Modine radiator, pump circulation; "Hy Duty" fan, 20 in. pulleys, 2 in. wide, flat belt. Champion spark plugs, ⅞ in. 3 rings to piston; diameter 4¼ in., width ¼ in. Tractor dimensions: Length 125 in., width 56 in., height 65 in.; shipping weight 4,500 lbs. Distributors: Maxim Munitions Corp., New York City; Miller Bros. Motor Co., Lake Charles, La.; Forry Truck & Tractor Co., Sioux City, Ia.; Alphons Kaelin, Louisville, Ky.

DAUCH MFG. CO., SANDUSKY, O.
SANDUSKY 10-20 MODEL J.

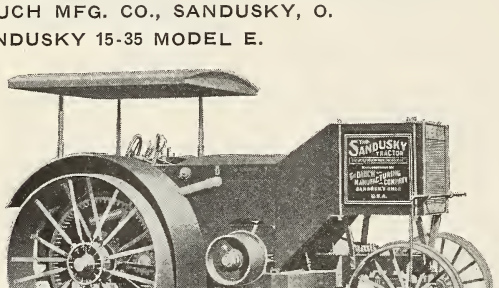
A 2-plow tractor with 2 steering wheels and 2 drive wheels; 10 h. p. on drawbar, 20 h. p. on belt; 2,000 lbs. pull at plowing speed; 2 speeds forward, 2 and 3 m. p. h.; diameter turning circle, 16 ft.; recommended for 24-in.

thresher; retail price f. o. b. factory Jan. 1, 1919, $1,500. Motor: Own make, L head, 4 cylinders vertical, 4¼x5¼ in.; 1,000 r. p. m.; fuel recommended, kerosene or distillate. Lubrication: Force feed and splash. Bearings: front and rear wheels and rear axle, bronze bushings; transmission, Hyatt roller and New Departure ball; jackshaft, SKF and Hyatt. Transmission: Enclosed gears, finished. Final drive: Enclosed Timken David Brown worm and open pinions and gears. Drive wheels 48 in.



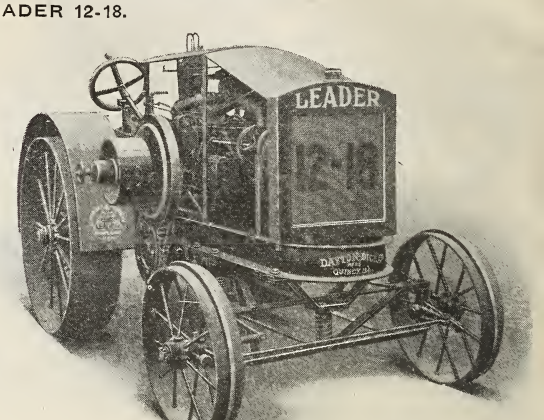
high, 12 or 18 in. wide. Pulley: 10x8 in., 1,000 r. p. m.; controlled through motor clutch, driven through gears. 2 compartment fuel tank, 15 gals. kerosene, 5 gals. gasoline. Bennett air cleaner. Dixie magneto with impulse starter. Own governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes fan, 18 in. ; flat belt, 2¼ in. wide. Spark plugs: ⅞ in. S. A. E. 7 rings to piston, 4¼x3-16. Tractor dimensions: Length 120 in., width 62 in., height 52 in.; shipping weight 4,960 lbs.; 205 cu. ft. packed for export.

DAUCH MFG. CO., SANDUSKY, O.
SANDUSKY 15-35 MODEL E.



A 4-plow tractor with 2 steering wheels and 2 drive wheels; 15 h. p. on the drawbar, 35 h. p. on the belt; 3,000 lbs. pull at plowing speed; 3 speeds forward, 2, 3½ and 5 m. p. h.; recommended for threshers up to 30 in.; operating weight 8,500 lbs.; turning circle 18 ft.; retail price $2,500 f. o. b. factory. Motor. Own make, L head, 4 cylinders vertical, 5x6½ in.; 800 r. p. m. normal; recommended for kerosene. Lubrication: Circulating splash with pump. Bearings: Front and rear wheels and real axle, bronze; transmission and jackshaft, babbitt. Transmission: Enclosed gears cut from blanks; 3 speeds forward. Final drive, spur gear and pinion. Diameter rear axle 3 in. Drive wheels: Diameter 56 in., width 16 in. Pulley: 15 in. diameter, 10 in. face; 800 r. p. m.; control by independent friction clutch; mounted on crankshaft; belt speed 3,120 ft. per minute. Double fuel tank, capacity 30 gals. Air cleaner, Bennett, filter type. Ignition: Dixie magneto with impulse starter. Own governor, centrifugal type. Carburetor: Kingston, double bowl, 2 in. inlet; mixture heated. Cooling: Candler and Perfex radiator, pump circulation. Spark plugs: 1 to cylinder, ⅞ in. S. A. E., short. 7 piston rings to cylinder. Hitch 11½ in. high, rigid. Spring mounted front and rear. Dimensions: Length over all 147 in., width 84 in., height 72 in.; wheel base 102 in.; shipping weight 9,300 lbs.; 444 cu. ft. packed for export.

DAYTON-DICK CO., QUINCY, ILL.
LEADER 12-18.

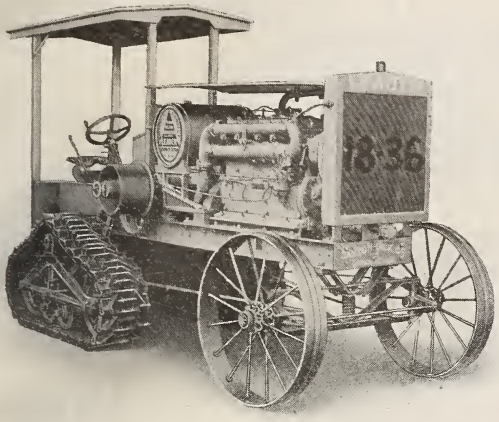


A 2 to 3-plow tractor with 2 steering wheels and 2 drive wheels; 10 h. p. on drawbar, 20 h. p. on belt; 2,000 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3⅓ m. p. h.; recommended for 22-in. thresher; diameter turning circle, 30 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,000. Motor: Own make, L head 2 cylinders opposed, 6¼x6 in., 800 r. p. m.; fuel recommended, kerosene. Lubrication: Detroit mechanical lubricator; oil recommended, Stanolind. Bearings: Front and rear wheels, transmission and jackshaft, plain; cooling fan, ball bearings. Transmission: Enclosed gears, own make, finished and heat treated. Final drive: Bull pinions and gears, semi-enclosed. Height of drive wheels 48 in., width 12 in. Pulley: 14x7 in., 800 r. p. m.; controlled through independent friction clutch, mounted on crankshaft; belt speed 2,900 ft. per min. 2 fuel tanks, 2 and 18 gals. Own air cleaner. Kingston magneto with impulse starter. Own governor. Kingston 1½-in. carburetor. Cooling: Eureka radiator, pump circulation; Oakes fan, 20 in.; diameter and width of fan belt pulleys, 2¾x1⅝ in.; flat belt, 34 in. long, 1½ in. wide. Spark plugs: Kingston, ½-in. pipe thread. 4 rings to piston, 6¼x⅜ in. 14 in. lateral adjustment of hitch. Tractor dimensions: Length 129 in., width 60 in., height 66 in.; shipping weight 4,800 lbs.; 289 cu. ft. packed for export.

DAYTON-DICK CO., QUINCY, ILL.
LEADER 18-36.

A 4 to 6-plow tractor with 2 steering wheels and 2 drive tracks; 16 h. p. on drawbar, 32 h. p. on belt; 4,000 lbs. pull at plowing speed; 2 speeds forward, 1.8 and 2½ m. p. h.; diameter turning circle 50 ft.; recommended for 28-in. thresher; retail price f. o. b. factory Jan. 1, 1919, $2,250. Motor: Twin City, L head, 4 cylinders vertical, 5x7½ in., 700 r. p. m.; fuel recommended, kerosene or distillate. Lubrication: Detroit mechanical lubricator; oil recommended, Stanolind. Bearings: Front wheels, transmission and jackshaft, plain; rear wheels, Hyatt roller; cooling fan, ball. Transmission: Own make, enclosed gears, finished and heat treated. Final drive: Open chain. Traction: 2 tracklayers, 50 in. long on ground, 15 in. wide. Pulley: 14x8 in., 750 r. p. m.; controlled by independent friction clutch, driven through

gears; belt speed 2,750 ft. per min. 2 fuel tanks, 2 and 18 gals. Ignition: K-W magneto with impulse starter. Kingston 1¾-in. carbuetor. Cooling: Eureka radiator, pump circulation; Oakes fan, 24 in.; fan belt pulleys



2½ in. diameter, 2⅛ in. wide; flat belt, 51 in. long. Spark plugs: ⅞ in. S. A. E. 3 rings to piston, 5x9-32 in. Lateral adjustment hitch, 14 in. Tractor dimensions: Length 153 in., width 64 in., height 96 in.; shipping weight, 6,500 lbs.; 520 cu. ft. packed for export.

DEPUE BROS. MFG. CO., CLINTON, IA.

DEPUE 20-30.

A 4-plow tractor driving through all 4 wheels; 20 h. p. on drawbar, 30 h. p. on belt; recommended for 32-in. thresher; 6,000 lbs. pull at plowing speed; 3 speeds forward, 2½, 3½ and 5 m. p. h.; diameter turning circle, 16 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,500. Motor: Buda, L head, 4 cylinders vertical, 4½x6 in., 800 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed; oil recommended, Mobiloil B. Timken roller bearings throughout. Transmission: Enclosed gears, own make, finished. Final drive: Bevel gear. Height of wheels, 40 in., width 10 in. Pulley: 12x6 in., 800 r. p. m.; controlled through motor clutch, driven through gears; belt speed 2,400 ft. per min. 2 fuel tanks, 25 and 2 gals. Bennett centrifugal air cleaner. Bosch magneto with impulse starter. Duplex governor. Stromberg 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes fan, 20 in.; fan belt pulleys 6x2 and 3x2 in.; flat belt, 36 in. long, 2 in. wide. Reflex spark plugs, ⅞ in. Hitch: Lateral adjustment 10 in.; vertical adjustment 6 in. Tractor dimensions: Length 140 in., width 56 in., height 84 in.; shipping weight 6,500 lbs.

G. I. DILL TRACTOR MFG. CO., HARRISBURG, ARK.

DILL.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 20 h. p. on drawbar; 3 speeds forward, 1½, 3 and 5 m. p. h.; diameter turning circle 40 ft.; retail price Jan. 1, 1919, $2,480 f. o. b. factory. Motor: Continental 4 cylinders vertical, L head, 4½x5½ in., 1,000 r. p. m.; recommended fuel, gasoline. Lubrication: Internal force feed; medium oil recommended for summer, light for winter. Bearings: Front wheels, babbitt; rear wheels, Hyatt rollers; transmission, SKF balls; jackshaft, Bower rollers; fan, Hoover balls. Transmission: Cotta enclosed gears, finished. Final drive: Open chain. Drive wheels 42 in. high, 36 in. wide. No power pulley. Fuel capacity 15 gals. Donaldson air cleaner. Bosch magneto. Pierce governor. Kingston 1¼-in. carburetor. Cooling: Eureka radiator, pump circulation; Oakes 24-in. fan, 3x2 in. pulleys, flat belt, 40x2 in. Champion ⅞ in. S. A. E. spark plugs. 3 rings to pistons, 4½x3-16 in. Lateral hitch adjustment 28 in., vertical 8 in. Tractor dimensions: Length 230 in., width 105 in., height 70 in.; shipping weight 5,500 lbs.

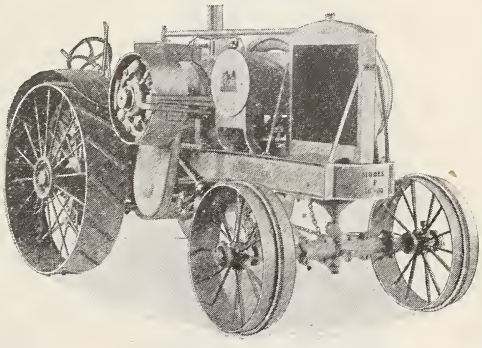
C. H. A. DISSINGER & BRO. CO., WRIGHTSVILLE, PA.

CAPITAL.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 20 h. p. on belt; recommended for 28-in. thresher; 3 speeds forward; diameter turning circle 30 ft.; retail price Jan. 1, 1919, $1,500 f. o. b. factory. Motor: Own, 4 cylinders vertical, L head, 4½x6½ in., 600 r. p. m.; recommended fuel, kerosene. Lubrication: External mechanical oiler. Enclosed gear transmission. Final drive: Enclosed bull pinions and gears. Drive wheels 60 in. high, 16 in. wide. Pulley: 12x8 in., 600 r. p. m.; controlled through motor clutch; belt speed 1,885 ft. per min. 2 fuel tanks, 12 and 30 gals. No air cleaner. Own magneto, governor and carburetor. Cooling: Ajax radiator, pump circulation, 20-in. fan; pulleys 1½x10 in.; flat belt 1½x39½ in. Vulcan spark plugs, ¾ in., 10 threads to inch. 5 rings to pistons, 4½x7-16 in. Lateral adjustment of hitch, 24 in., vertical 10 in. Tractor dimensions: Length 12 ft., width 9½ ft., height 10 ft., including canopy top; shipping weight 4,500 lbs. Special features: Spring drive trunion on jackshaft absorbs shocks; pump has capacity to lift water 20 ft. through 1¼-in. pipe and can be used for spraying or fire protection.

EAGLE MFG. CO., APPLETON, WIS.

EAGLE 12-22.

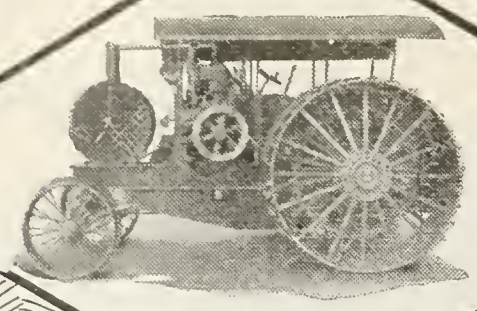


A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 22 h. p. on belt; recommended for 28-in. thresher; 2,600 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3 m. p. h.; diameter turning circle 24 ft. Motor: Eagle twin horizontal, valve in head, 7x8 in., 425 r. p. m.; recommended for kerosene. Lubrication: External mechanical oiler. Hyatt roller bearings in transmission. Transmission: Enclosed gears, rough. Final drive: Open bull pinions and gears. Drive wheels 52 in. high, 12 in. wide. Pulley: 20x10 in., 425 r. p. m.; controlled through motor clutch; mounted on crankshaft; belt speed 2,225 ft. per min. 2 fuel tanks, 5 and 18 gals. Bennett air cleaner. Dixie magneto with impulse starter. Own governor. Linga 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; 21-in. fan. pulleys 4 in. diameter, flat belt 1½ in. wide. Spark plugs ½-in. pipe thread. 4 rings to pistons, 7x½ in. Tractor dimensions: Length 140 in., width 70 in., height 78 in.; shipping weight 5,850 lbs.

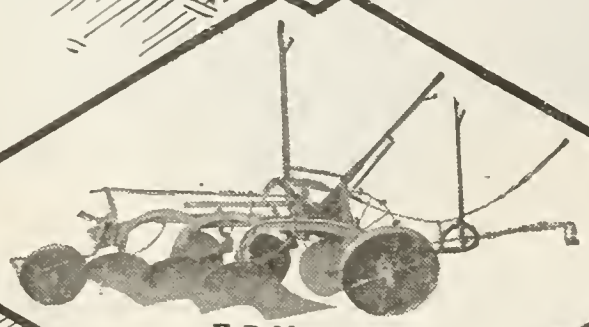
12-20 Model AA Kerosene Tractor

Pulls Like A Locomotive

E-B 20-35 Tractor



E-B 40-65 Tractor



E-B Nos. 102 and 103 Tractor Plows

THE E-B LINE
EMERSON BRANTINGHAM
FARM MACHINERY

THE New E-B Model AA Tractor rated at 12-20 horsepower S. A. E. Rating (Society of Automotive Engineers) actually pulls 25% more. 15 horsepower on the drawbar. 25 horsepower on the belt.

As for the weight and price—both surprisingly low.

Read this list of other good qualities:

So easily handled and controlled that a boy or woman can operate it.

All gears enclosed and dust proof — insurance against excessive wear.

The 12-20 is S. A. E. rating—only 80 per cent of the actual power the tractor develops.

Easy to care for—only grease cups to be filled daily are on the fan and front wheels.

Four wheels — none running in the furrow, front and rear wheels track.

Four-cylinder E-B Kerosene Motor — economical, reliable, elastic power.

Equipped with the best accessories on the market, K. W. Magneto, Bennett Carburetor, has Bennett air cleaner, Hyatt Roller Bearings, Bantam Ball Thrust Bearings, Modine Radiator.

Other sizes, 20-35 and 40-65.

Built by a company that has been the leader in tractor manufacturing for 11 years and has originated the best features in modern tractor design.

Write for Facts at once. Get illustrated folder. Write TODAY.

EMERSON-BRANTINGHAM IMPLEMENT CO., Inc.

Good Farm Machinery ROCKFORD, ILLINOIS *Established 1852*

TOOLS OF PROSPERITY

E-B (Emerson) Plows
E-B (Emerson) Tractor Plows
E-B (Emerson) Harrows
E-B (Emerson) Planters
E-B (Emerson) Grain Drills
E-B (Emerson) Cultivators
E-B (Emerson) Listers
E-B Potato Machinery
E-B (Standard) Mowers
E-B Osborne Harvest. Machinery
E-B Hay Tools
E-B Baling Press
E-B (Emerson) Spreaders
E-B (Emerson) Gas Engines
E-B (Newton) Wagons
E-B (Emerson) Buggies
E-B (Emerson) Auto Trailers
E-B (Reeves) Threshers
E-B (Geiser and Peerless) Threshers
E-B (Geiser) Saw Mills
E-B (Reeves and Peerless) Steam Engines
E-B 12-20 Model AA Tractor
E-B (Big Four) 20-35 Tractor
E-B (Reeves) 40-65 Tractor

YOUR PROBLEM—To increase crops with decreased help
YOUR REMEDY — E-B Tractors and Labor-Saving Farm Machinery

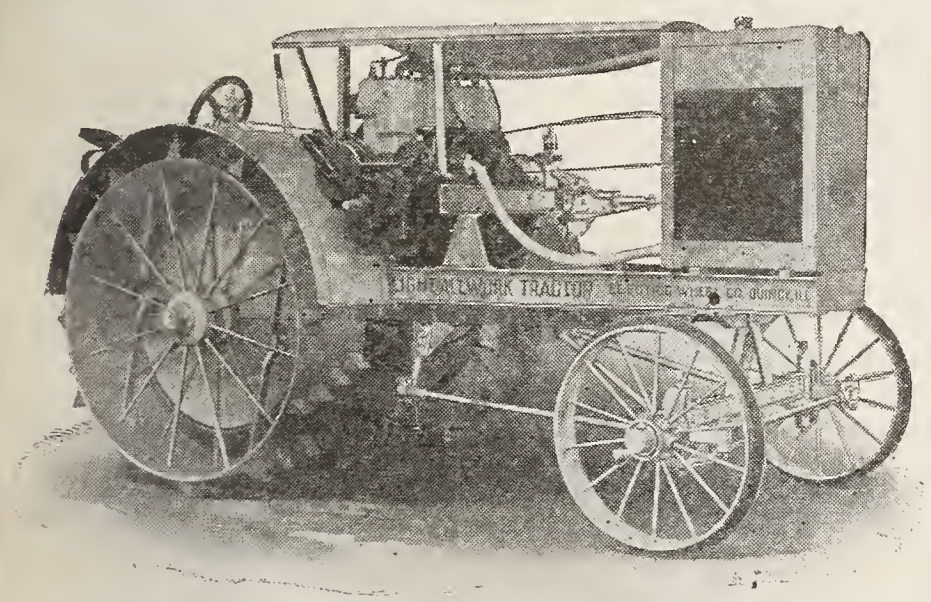
EAGLE MFG. CO., APPLETON, WIS.
EAGLE 16-30.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 30 h. p. on belt; recommended for 32-in. thresher; 3,800 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3 m. p. h.; diameter turning circle 24 ft. Motor: Eagle twin horizontal, valve in head, 8x8 in., 425 r. p. m.; recommended for kerosene. Lubrication: External mechanical oiler. Hyatt roller bearings in transmission. Transmission: Enclosed gears, rough. Final drive: Open bull pinions and gears. Drive wheels 52 in. high, 12 in. wide. Pulley: 24x10 in., 425 r. p. m.; controlled through motor clutch; mounted on crankshaft; belt speed 2,660 ft. per min. 2 fuel tanks, 5 and 18 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Own governor. Linga 2-in. carburetor. Cooling: Perfex radiator, pump circulation; 21-in. fan; pulleys 4 in. diameter; flat fan belt 1½ in. wide. ½-in. spark plugs. 3 rings to pistons, 8x½ in. Tractor dimensions: Length 140 in., width 70 in., height 78 in.; shipping weight 7,000 lbs.

ELDERFIELDS RESERVATION, INC., FLOWER HILL, VIA PLANDOME, NASSAU CO., N. Y.
UNIVERSAL.

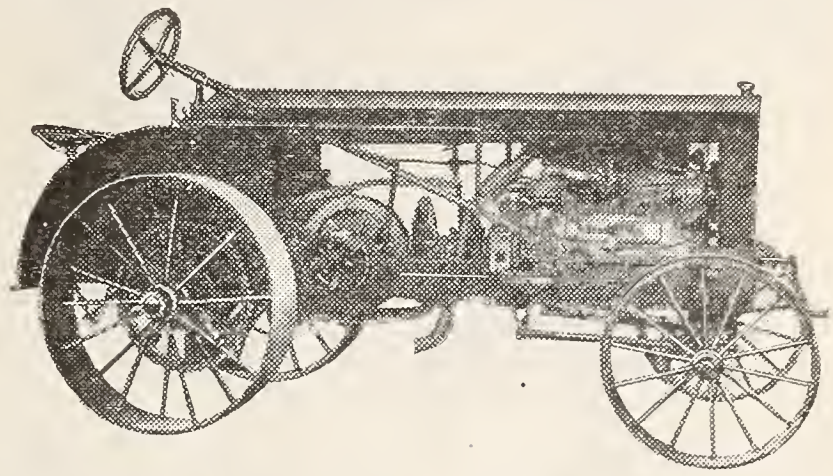
A 1-plow (10-in. bottom) tractor cultivator with 2 drive wheels in front and 1 supporting wheel in rear, operator walking behind and guiding by the handles; 1 h. p. on drawbar, 4 h. p. on belt; 200 lbs. pull at plowing speed; 1 speed forward throttling from 1 to 3 m. p. h.; diameter turning circle 60 in.; retail price Jan. 1, 1919, $425 f. o. b. factory. Motor: Own 1 cylinder vertical, L head, 3½x5 in., 1,000 r. p. m.; recommended fuel, gasoline. Splash lubrication; Monogram medium oil recommended. Plain bearings throughout. Transmission: Own enclosed gears, finished. Final drive: Worm to live axle. Drive wheels 36 in. high, 5 in. wide. Pulley: 5x2 in., 1,000 r. p. m.; belt speed 1,310 ft. per min. 1 fuel tank, 2½ gals. Atwater-Kent ignition. Own governor. Zenith ⅝-in. carburetor. Cooling: Ajax radiator, thermo-syphon circulation; fan in flywheel. Red Head spark plug, ⅞ in. S. A. E. 2 rings to pistons, 3½x3-16 in. Tractor dimensions: Length 84 in., width 33½ in., height 48 in.; shipping weight 750 lbs.; 73½ cu. ft. packed for export.

ELECTRIC WHEEL CO., QUINCY, ILL.
ALLWORK 14-28.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 14 h. p. on drawbar, 28 h. p. on belt; 3,000 lbs. pull at plowing speed; 2 speeds forward, 1¾ and 2.4 m. p. h.; recommended for 24-in. thresher with all attachments; operating weight 5,000 lbs.; turning radius 24 ft. Motor: Own, L head, 4 cylinders vertical, 5x6 in.; 800 r. p. m.; fuel recommended, kerosene. Lubrication: Circulating splash. Bearings: Plain in front and rear wheels; roller in rear axle; transmission and jackshaft babbitt. Transmission: Enclosed forged gears, 2 speeds forward. Final drive, enclosed spur gears with spur pinions. Diameter of drive wheels 48 in., width 12 in. Pulley: 12½x 7 in., 800 r. p. m.; controlled through motor clutch; driven direct from motor; belt speed 2,514 ft. per minute. 2 fuel tanks, 5 and 25 gals. Ignition: Kingston magneto with impulse starter. Own governor, fly ball throttling type. Carburetor: Kingston, single bowl, 1½ in. inlet; mixture heated by hot air from manifold and also onto cylinders. Cooling: Water, Perfex radiator, pump circulation, Hotz 23½-in. fan. Spark plugs: ⅞ in., 18 threads to in. Piston rings, 4 to piston; 5 in. outside diameter, width 9-32 in. Hitch: 14 in. high; lateral adjustment 24 in., vertical adjustment 10 in. Frame mounted on three points, solid. Dimensions: Length over all 125 in., width 74 in., height 72 in.; wheel base 80 in.; shipping weight 5,400 lbs.; 200 cu. ft. packed for export.

ELGIN TRACTOR CORP., PIQUA, O.
NEW ELGIN 12-25.

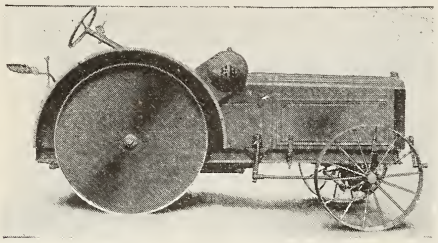


A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; 2,400 lbs. pull at plowing speed; 6 speeds forward, ⅛ to 3½ m. p. h.; recommended for 24-in. thresher; diameter turning circle 12 ft.; retail price f. o. b. factory, Jan. 1, 1919, $1,385. Motor: Erd, valve in head, 4 cylinders vertical, 4x6 in., 900 r. p. m.; fuel recommended, kerosene, gasoline or distillate. Lubrication: Circulating splash and force feed; oil recommended, heavy in summer and light in winter. Bearings: Front and rear wheels and rear axle, Timken roller; transmission and jackshaft, Hyatt and New Departure. Transmission: Friction, own make, reduction gears enclosed. Final drive: Open chain. Drive wheels 42 in. high, 10 in. wide. Pulley: 9x8 in., 900 r. p. m.; controlled by friction clutch; belt speed 2,000 ft. per min. 2 fuel tanks, 5 and 18 gals. Bennett air cleaner. Dixie magneto with impulse starter. Erd governor. Kingston 1¼-in. carburetor. Cooling: Modine radiator, pump circulation; Erd fan, 20 in.; round spring belt. Spark plugs: Champion, ⅞ in. S. A. E. 4 rings to piston, ¼x4 in. Hitch: Lateral adjustment, 10 in., vertical 16 in. Tractor dimensions: Length 128 in., width 54 in., height 58 in.; shipping weight 3,400 lbs.; 170 cu. ft. packed for export.

EMERSON-BRANTINGHAM CO., ROCKFORD, ILL.
E-B 9-16.

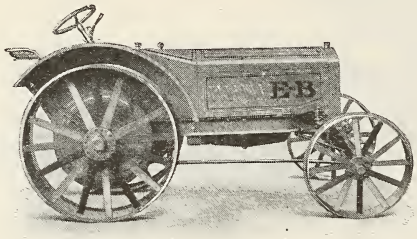
A 2-plow tractor with 2 drive wheels and 2 steering wheels; 1,500 lbs. pull at plowing speed; recommended for 18-in. thresher; 2 speeds forward, 1.72 and 2⅓ m. p. h.; turning radius 27 ft. Motor: Own, 4 cylinders vertical, L head, 4⅛x4½ in., 800 r. p. m.; recommended for gasoline. Lubrication: Circulating splash. Bearings: Front wheels, plain; rear axle, transmission and jackshaft, Hyatt rollers. Transmission: Enclosed gears,

finished. Final drive: Gear to live axle. Drive wheels 54 in. high, 8 in. wide. Pulley: 12x6 in., 800 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,500 ft. per min. 1 fuel tank, 20 gals. Bennett



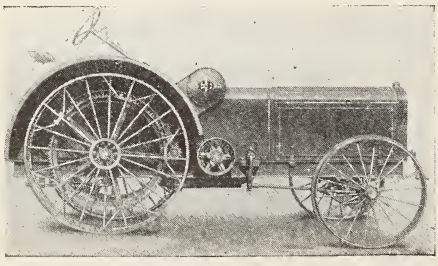
centrifugal air cleaner. K-W magneto with impulse starter. Bennett 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; 18-in. fan. Champion spark plugs, ½ in. Tractor dimensions. Length 150½ in., width 72 in., height 76¾ in.; shipping weight 4,260 lbs.

EMERSON-BRANTINGHAM CO., ROCKFORD, ILL. E-B MODEL AA.



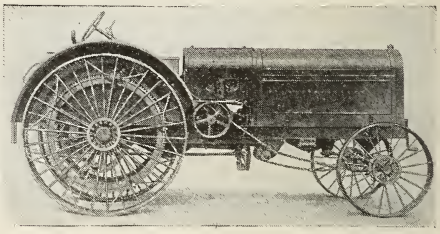
A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; 2,600 lbs. pull at plowing speed; recommended for 24 to 26-in. thresher; 2 speeds forward, 1.8 and 2⅓ m. p. h.; turning radius 12½ ft. Motor: Own, 4 cylinders vertical, L head, 4¾x5 in., 900 r. p. m.; recommended for kerosene. Lubrication: Circulating splash. Bearings: Front wheels, plain; rear axle, transmission and jackshaft, Hyatt rollers. Transmission: Enclosed gears, finished. Final drive: Bull gears and pinions, enclosed. Pulley: 12x6⅜ in., 900 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,825 ft. per min. 2 fuel tanks, 4 and 20 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Own governor. Bennett 1½-in. carburetor. Cooling: Modine radiator, pump circulation; 20-in. fan. Champion spark plugs, ½ in. 3 rings to pistons, 4¾x5-16 in. Lateral hitch adjustment 16 in., vertical 5 in. Tractor dimensions: Length 11 ft., width 61 in., height 75¼ in.; shipping weight 4,755 lbs.

EMERSON-BRANTINGHAM CO., ROCKFORD, ILL. E-B 12-20.



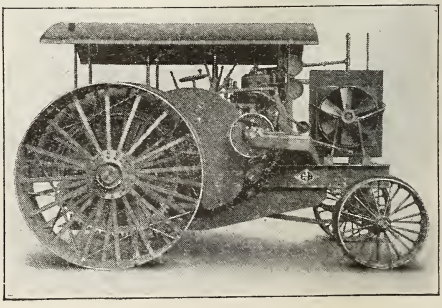
A 3-plow tractor with 2 drive wheels and 2 steering wheels; 2,000 lbs. pull at plowing speed; recommended for 24-in. thresher; 2 speeds forward, 1.7 and 2¼ m. p. h.; turning radius 30 ft. Motor: Own, 4 cylinders vertical, L head, 4¾x5 in., 850 r. p. m.; recommended for kerosene. Lubrication: Circulating splash. Bearings: Front wheels, plain; rear axle, transmission and jackshaft, Hyatt rollers. Transmission: Enclosed gears, finished. Final drive: Bull pinions and gears, open. Drive wheels 50 in. high, 12 in. wide. Pulley: 14x9 in., 708 r. p. m.; controlled by motor clutch, driven through gears; belt speed 2,590 ft. per min. 2 compartment fuel tank, 16 and 4 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Bennett 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; 20-in. fan. Champion spark plugs, ½ in. 3 rings to pistons, 4¾x5-16 in. Tractor dimensions: Length 164¼ in., width 78 in., height 86 in.; shipping weight 6,155 lbs.

EMERSON-BRANTINGHAM CO., ROCKFORD, ILL. E-B 20-35.



A 5-plow tractor with 2 drive wheels and 2 steering wheels; 3,300 lbs. pull at plowing speed; recommended for 28-in. thresher; 2 speeds forward, 1.7 and 2¼ m. p. h.; turning radius 38 ft. Motor: Own, 4 cylinders vertical, L head, 5x7 in., 700 r. p. m.; recommended for kerosene. Lubrication: Circulating splash; Big Four motor oil recommended. Bearings: Plain in wheels; roller in transmission and jackshaft; bronze bushing in fan. Transmission: Enclosed gears, finished. Final drive: Open bull gears and pinions. Drive wheels 72 in. high, 16 in. wide. Pulley: 16¾x9 in., 600 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,670 ft. per min. 2 fuel tanks, 5 and 35 gals. Bennett air cleaner, centrifugal water type. K-W magneto with impulse starter. Pickering governor. Bennett 1½-in. carburetor. Cooling: Modine radiator, pump circulation; 21-in. fan; pulleys 5 and 10x2 5-16 in.; flat belt 52x2¼ in. Champion spark plugs, ½ in. 3 rings to pistons, 5x⅜ in. Lateral hitch adjustment 18 in. Tractor dimensions: Length 16 ft., width 7 ft., height 8 ft.; shipping weight 10,000 lbs.

EMERSON-BRANTINGHAM CO., ROCKFORD, ILL. E-B REEVES 40-65.



An 8 to 10-plow tractor with 2 drivers and 2 steering wheels; 40 h. p. on drawbar, 65 h. p. on belt; 10,000 lbs.

pull at plowing speed; recommended for threshers up to 44 in.; 1 speed forward, 2 m. p. h.; turning radius 23 ft. 6 in. Motor: Own, 4 cylinders vertical, L head, 7¼x9 in., 500 r. p. m.; recommended for kerosene. Lubrication: Detroit force feed oiler, splash and internal pressure; recommended oil, Standard Gas Engine. Plain bearings throughout. Transmission: Open gears, rough. Final drive: Bull pinions and gears, open. Drive wheels 90 in. high, 24 in. wide. Pulley: 22x10½ in., 500 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 2,880 ft. per min. 2 fuel tanks, 8 and 63 gals. K-W magneto with impulse starter. Own governor. Bennett 2½-in. carburetor. Cooling: Perfex radiator, pump circulation; 32 in. fan; pulleys 9⅝ and 4½x3½ in.; flat belt 129x3 in. Champion heavy duty spark plugs, ½ in. 4 rings to pistons, 7¼x½ in. Lateral hitch adjustment 50 in. Tractor dimensions: Length 17 ft., width 112 in., height 121 in.; shipping weight 22,500 lbs.; 1,436 cu. ft. packed for export.

ESSEX TRACTOR CO., LTD., ESSEX, ONT.
ESSEX.

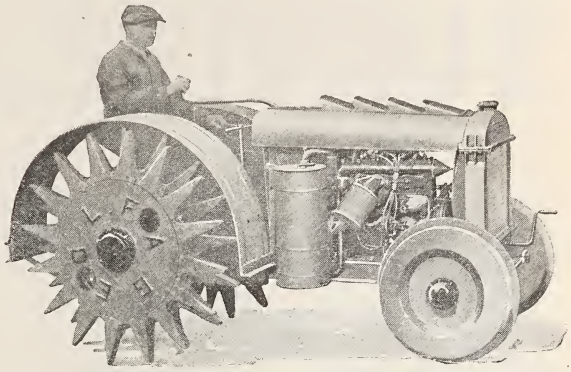
A 2-plow tractor with 2 drive wheels and 2 steering wheels; 10 h. p. on drawbar, 20 h. p. on belt; recommended for 24-in. thresher; 2 speeds forward, 2½ to 3½ m. p. h.; 14 ft. turning circle; retail price Jan. 1, 1919, $950 f. o. b. factory. Motor: Gile, L head, 2 cylinders horizontal opposed, 5½x6½ in., 750 r. p. m.; recommended for kerosene. Madison-Kipp force feed oiler. Plain bearings throughout. Transmission: Enclosed gears, cut. Final drive: Open roller pinions and bull gears. Drive wheels 42 in. high, 10 in. wide. Pulley: 11x6 in., 750 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 2,160 ft. per min. 2 fuel tanks, 1 and 15 gals. Own air cleaner. Dixie magneto with impulse starter. Gile governor. Schebler 1½-in. carburetor. Cooling: Water tank, pump circulation. Champion ½ in. spark plugs. 3 ½-in. rings to pistons. Lateral hitch adjustment 14 in. Tractor dimensions: Length 62 in., width 62 in., height 50 in.; shipping weight 3,200 lbs.

EVANS MFG. CO., HUDSON, O.
HUDSON.

A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; 3,500 lbs. pull at plowing speed; 2 speeds forward, 2½ and 4 m. p. h.; recommended for 30 in. thresher; diameter turning circle 10 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,985. Motor: Buda, L head, 4 cylinders vertical, 4½x6 in., 1,000 r. p. m.; fuel recommended, gasoline. Internal force feed lubrication. Bearings: Front and rear wheels and jackshaft, Timken roller; transmission, Timken and Hyatt roller; cooling fan, Hyatt roller. Transmission: Elclosed gear, own make, finished. Final drive: Enclosed bull pinion and gear. Drive wheels 60 in. high, 12 in. wide. Pulley: 24x8 in., 412 r. p. m.; controlled by motor clutch; driven through gears; belt speed, 2,600 ft. per min. 1 fuel tank, 35 gals. Holley air cleaner. Dixie magneto with impulse starter. Simplex governor. Rayfield carburetor, 1½ in. Cooling: Candler radiator, pump circulation; flat belt, 28 in. long and 1½ in. wide. Spark plugs: Splitdorf, ⅞ in., 18 threads to in. 4 rings to piston, 4½x¼ in. Hitch: Lateral adjustment, 28 in., vertical 3 in. Tractor dimensions: Length 164 in., width 56 in., height 60 in.; shipping weight 5,800 lbs.

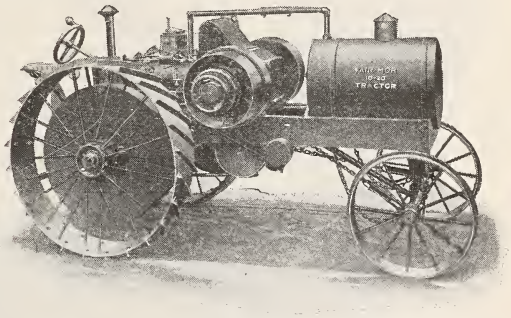
FAGEOL MOTORS CO., OAKLAND, CAL.
FAGEOL 8-12.

A 2-plow tractor with 2 "walking" drive wheels (no rim—spokes enlarged), and 2 steering wheels; 8 h. p. on drawbar, 12 h. p. on belt; 1,250 lbs. pull at plowing speed; 1 speed forward, 2½ m. p. h.; diameter turning circle 14 ft.; retail price Jan. 1, 1919, $1,500 f. o. b. factory. Motor: Overland 4 cylinders vertical, L head, 3⅜x5 in., 1,200 r. p. m.; recommended for gasoline, distillate or kerosene. Circulating splash lubrication; recommended oil, Zerolene medium in summer, light in winter. Bearings: Plain in front wheels; Timken roller in rear wheels when in action, idling plain; Fafnir balls in transmission. Transmission: Enclosed gears, own make, finished. Final



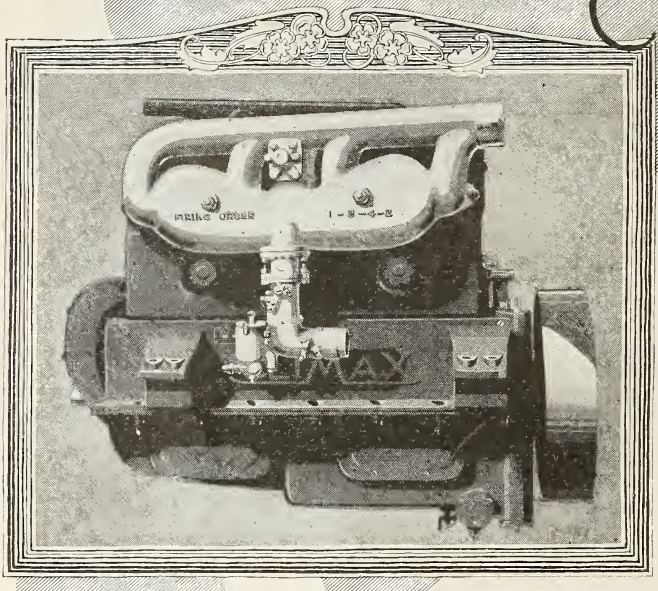
drive: Expanding clutches to hubs of drive wheels, no differential. Drive wheels 48 in. high. Pulley: 8x6 in., 1,000 r. p. m.; controlled by motor clutch; belt speed 2,100 ft. per min. One fuel tank, 10 gals. Vacuum bag air cleaner. Dixie magneto. Tillotson 1-in. carburetor. Cooling: Flexo core radiator, pump circulation; 16-in. fan, 5½-in. V pulleys. Champion ½-in. spark plugs. 3 rings to pistons, 3⅜x3-16 in. Self-adjusting hitch. Tractor dimensions: Length 107 in., width 55 in., height 42 in.; shipping weight 3,400 lbs. Distributors: Butler-Veitch, Oakland, Cal., for Pacific coast; J. F. Waal, Bandoend, Java, for Dutch East Indies; H. L. Van der Hass, Santiago, Chili, for western South America; Pacific Trading Co., Japan.

FAIRBANKS, MORSE & CO., CHICAGO.
FAIR-MOR 10-20.



A 2-plow tractor with 2 drive wheels and 2 steering wheels; 10 h. p. on drawbar, 20 h. p. on belt; 1,750 lbs. pull at plowing speed, 2¼ m. p. h.; operating weight 4,000 lbs.; turning radius 13 ft. Motor: Valve in head, 2 cylinders twin horizontal, 6x7 in., 600 r. p. m.; recommended fuel, kerosene or gas. Lubrication: Mechanical force feed oiler. Drive wheels 48 in. high, 10 in. wide. Pulley: 18x6½ in., 600 r. p. m.; controlled by independent friction clutch; driven direct from motor; belt speed 2,800 ft. per minute. 1 fuel tank, capacity 10 gals. Equipped with double bowl carburetor. Dimensions: Length over all 120 in., width 57 in., height 66 in.; shipping weight 3,750 lbs.

FARM TRACTORS *that will* SURVIVE *and* THRIVE



are the ones that are equipped with a real Tractor Engine

—The quality of the Engine is the test of a Tractor's life and the best measure of its success.

—Pick out the really great successes of the automobile industry and you will find they became great because of the unusual performance of their better motors.

—Today you can pick out those Farm Tractors that are most likely to survive by judging them by the quality of the ENGINES they use.

—As time goes on Tractor users are going to realize more and more that the successful consistent performance of ANY tractor depends more than anything else upon the motor it uses.

—Manufacturers who recognize this fact and who provide the best Tractor Motor the industry has developed will SURVIVE and THRIVE.

You can depend upon the continued satisfactory performance of any Farm Tractor that is equipped with

CLIMAX

The "No Trouble" Engine
FOR FARM TRACTORS

Made By **CLIMAX ENGINEERING CO** 1800 So. 4th St. CLINTON, IA.

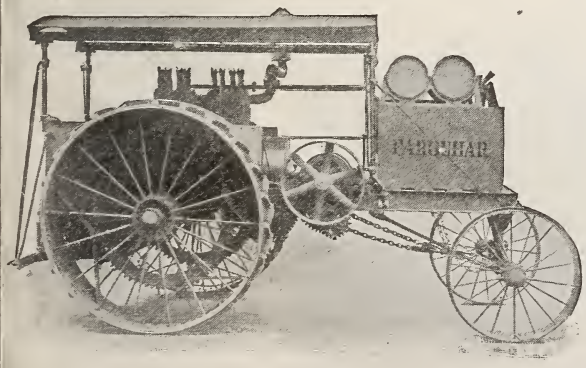
FARM HORSE TRACTION WORKS, HARTFORD, S. D.
FARM HORSE 16-30.

A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 38 h. p. on belt; recommended for 28 in. thresher; 2 speeds forward; diameter turning circle, 25 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,485. Motor: Climax L head, 4 cylinders vertical, 5x6½ in., 800 r. p. m.; fuel recommended, kerosene. Lubrication: Pressure feed; oil recommended, Mobiloil B and extra heavy Polarine in summer, heavy and Mobiloil A in winter. Transmission: Own make enclosed gears, finished. Final drive: Chain, enclosed. Drive wheels, 48 in. high, 24 in. wide. Pulley: 14x8 in., 800 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 2,925 ft. per min. 2 fuel tanks, 5 and 18 gals. Bennett air cleaner. Dixie magneto with impulse starter. Climax governor. Bennett 1½-in. carburetor. Cooling: Modine radiator, pump circulation; Oakes 20-in. fan; flat belt, 1½ in. Champion spark plugs, ⅞ in. 3 rings to piston, 5x⅜ in. Hitch: Lateral adjustment, 12 in., vertical, 6 in. Tractor dimensions: Length 11 ft., width 6½ in., height 5½ ft.; shipping weight 4,900 lbs.

A. B. FARQUHAR CO., LTD., YORK, PA.
FARQUHAR 15-25.

A 3 to 4-plow tractor with 2 drive wheels and 1 steering wheel; 15 h. p. on drawbar, 25 h. p. on belt; 2,500 lbs. pull. at plowing speed; 2 speeds forward, 2¼ and 4 m. p. h.; recommended for 27 in. thresher; weight less fuel and water, 6,000 lbs. Motor: Buda, L head, 4 cylinders vertical, 4½x6 in., 900 r. p. m. Lubrication: Pressure. Bearings: Hyatt rollers in transmission and axle. Transmission: Nuttall enclosed forged gears, 2 speeds forward. Final drive: Worm to intermediate shaft, enclosed external spur gears to drive wheels. Drive wheels: 54 in. high, 14 in. wide. Pulley: 14x7 in., 800 r. p. m.; controlled by motor clutch; belt speed, 2,925 ft. per minute. 2 fuel tanks, kerosene 25 gals., gasoline 5 gals. Air cleaner: Bennett, centrifugal. Ignition: K-W high tension magneto. Carburetor: Kingston, 1½ in. inlet; air intake heated, water injection used. Cooling: Water; Perfex radiator, pump circulation. Spark plugs, ⅞ in., 18 threads. Hitch: 17 in. high. Frame spring mounted. Dimensions: Length over all 161 in., width 74 in., height 68 in.; wheel base 90 in.; shipping weight 6,000 lbs.

A. B. FARQUHAR CO., LTD., YORK, PA.
FARQUHAR 18.



A 4 to 5-plow tractor with 2 drive wheels and 2 steering wheels; 18 h. p. on drawbar; 3,600 lbs. pull at 2.3 m. p. h.; weight less fuel and water, 16,000 lbs. Motor: Own, valve in head, 4 cylinders vertical 6x8 in., 550 r. p. m. Lubrication: Detroit force feed oiler and splash. Plain bearings throughout. Final drive: Open external spur gears and pinions. Drive wheels: 84 in. high, 20 in. wide. Pulley: 32x9 in., 275 r. p. m.; controlled by independent friction clutch; belt speed 2,300 ft. per minute. 2 fuel tanks, kerosene 30 gals., gasoline 30 gals. No air cleaner. Ignition: K-W high tension magneto. pump circulation. Spark plugs: Splitdorf, 1 to cylin- Carburetor: Kingston, 2 in. inlet; air intake heated, water injection used. Cooling: Water; own tubular radiator, pump circulation. Spark plugs, ⅞ in., 18 threads. Hitch: 24 in. high. Frame mounted solid. Dimensions: Length over all 216 in., width 98 in., height 118 in.; wheel base 132 in.; shipping weight 16,000 lbs.

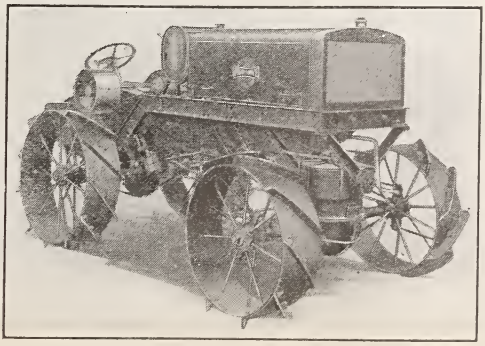
A. B. FARQUHAR CO., LTD., YORK, PA.
FARQUHAR 25.

A 6 to 7-plow tractor with 2 drive wheels and 2 steering wheels; 25 h. p. on drawbar; 5,000 lbs. pull at 2.3 m. p. h.; weight less fuel and water, 19,000 lbs. Motor: Own, valve in head, 4 cylinders vertical, 7x8 in., 550 r. p. m. Lubrication: Detroit force feed oiler and splash. Bearings plain throughout. Final drive: Open external spur gears and pinions. Drive wheels: 84 in. high, 20 in. wide. Pulley: 32x9 in., 275 r. p. m.; controlled by independent friction clutch; belt speed 2,300 ft. per minute. 2 fuel tanks, kerosene 30 gals., gasoline 30 gals. No air cleaner. Ignition: K-W high tension magneto. Carburetor: Kingston, 2 in. inlet; air intake heated; water injection used. Cooling: Water; own tubular radiator, pump circulation. Spark plugs, ⅞ in., 18 threads. Hitch: 24 in. high. Frame mounted solid. Dimensions: Length over all 216 in., width 106 in., height 118 in.; wheel base 132 in.; shipping weight 19,000 lbs.

HENRY FORD & SON, DEARBORN, MICH.
FORDSON 22.

A 2-plow tractor with 2 drive wheels and 2 steering wheels; 22 b. h. p. at 1,000 r. p. m. burning kerosene; 1,800 lbs. pull at plowing speed, 2,500 lbs. pull in low gear; weight 2,500 lbs.; turning radius 10½ ft. Motor: Own, L head, 4 cylinders vertical, 4x5 in., 1,000 r. p. m.; recommended fuel, kerosene. Lubrication: Circulating splash. Bearings: Gurney balls in transmission; Hyatt rollers in rear axle. Transmission: Enclosed gears, 3 speeds forward, 1½, 2¾ and 6¾ m. p. h. Final drive: Worm. Drive wheels 42 in. high, 12 in. wide. Pulley: 9x6 in., 1,000 r. p. m.; controlled by motor clutch; driven through bevel gears; belt speed 2,355 ft. per minute. 2 fuel tanks, kerosene 21 gals., gasoline ½ gal. Air cleaner: Holly, water filter type. Ignition: Own magneto. Ford type. Holley carburetor. Cooling: Water; vertical tube radiator, thermo-syphon circulation.

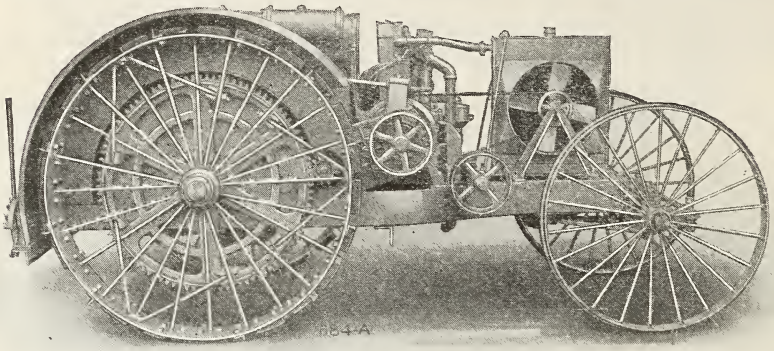
FOUR DRIVE TRACTOR CO., BIG RAPIDS, MICH.
FOUR DRIVE.



FRICK 12-25 KEROSENE TRACTOR

WAYNESBORO, PA. U. S. A.

Has a Fuel Cost Record of 32 6-10 Cents per Acre



Specifications

Motor — 4 cyl., 4 cycle, 900 r. p. m. valve-in-head, 4 in bore, 6 in. stroke.
Drawbar — 12 H.P. pulls 3-14 in. bottoms in stiff work.
Break Horse Power —25 H.P.
Ignition — Kingston high tension magneto with impulse starter.
Carburetor — Kingston, burns kerosene or gasoline; Bennett air cleaner.
Cooling — Water cooled, Perfex radiator, centrifugal pump.
Clutch — Friction tractor clutch with shoes 3 in. wide.
Transmission — Selective type, 2 speeds forward, one reverse.
Bearings — Roller bearings throughout excepting main axle which is babbitted.
Capacity Fuel Tank —20 gallons.
Belt Pulley—13 in. diameter, 7 in. face.
Speeds — Forward 2-3/10 miles per hour, and 3-8/10 miles per hour. Backward, 2 miles per hour.
Weight — 5,800 lbs.

Reasons the Frick is the Right Tractor to Buy

(1) Has a four Cylinder, Valve-in-Head Motor. (2) Burns cheap fuel—Kerosene preferred. (3) Three Plow size. (4) Right belt power for farm machinery. (5) Convenient to line up and belt to any machinery. (6) A Four Wheeled Tractor. (7) The Traction Wheels are behind—near the load—where most effective. (8) The operator has clear view ahead. (9) Travels and guides in the furrow, when plowing. (10) The center of draft line corresponds to the center of draft line of 3 Plow Gang. (11) No unnecessary side draft—a saving of fuel and power. (12) Travel-in-the-furrow type insures good plowing. (13) With the travel-in-the-furrow Tractor there is relief from constant guiding. (14) Motor Lubricated by both splash system and force Feed Oil Pump. (15) Transmission Gears are all enclosed and run in oil bath. (16) Two speeds forward, one reverse. (17) Fuel operating cost as low as the lowest. (18) Has fuel cost record of .326 per acre. (19) The Farmer for many reasons likes the roomy Operator's platform. (20) The pivoted front wheel spindles provide a short turning radius. (21) Does well every service for which a Tractor is needed. (22) Is built for hard and continuous work. (23) Has back of it an old established firm whose reputation is the strongest of guarantees.

In short the **FRICK—12-25 — 3 Plow Kerosene Tractor** is a better investment for the user than any other size or type of tractor made.

Get Our Tractor Catalog, Prices and Terms

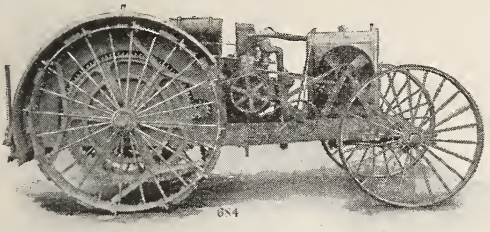
Frick Company
(Incorporated)
Waynesboro, Pa.

Card, Adams & Morris
Western Sales Representatives
Lincoln - Nebraska

A 4-plow tractor with 4 driving wheels; 15 h. p. on drawbar, 26 h. p. on belt; recommended for 28-in. thresher; 2,250 lbs. pull at plowing speed; 3 speeds forward; diameter turning circle, 9 ft. 6 in.; retail price f. o. b. factory Jan. 1, 1919, $2,500. Motor: Beaver, valve in head, 4 cylinders vertical, 4½x6 in., 950 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed; oil recommended BB Mobiloil. Bearings: Front and rear wheels, own make; rear axle, Timken roller; transmission, ball and roller. Transmission: Cotta enclosed gear, finished. Final drive: Worm in rear, bevel in front. Drive wheels: Rear, 42 in. high; front, 36 in. high; width, 12 in. Pulley: 14x8 in., 710 r. p. m.; controlled through motor clutch, driven through gears; belt speed 2,600 ft. per min. 2 fuel tanks, 2 and 25 gals. Bennett air cleaner. Dixie magneto with impulse starter. Lauson governor. Kingston carburetor, 1½ in. Cooling: Perfex radiator, pump circulation; Oakes 22 in. fan; diameter of fan belt pulleys, 6 in., width 2½ in.; flat belt, 16½ ft. long, 1½ ft. wide. Champion spark plugs. Tractor dimensions: Length 10 ft. 10 in., width 5 ft. 9 in., height 5 ft. 11½ in.; shipping weight 6,000 lbs. Branches and distributors: Kessler Motor Sales Co., St. Joseph, Mo.; Geo. W. Smith, Denver, Colo.; Fred Walsh, Glendale, Ariz.; Snyder Motor Car Co., Spokane, Wash.; Wm. P. Nisbett, Moose Jaw, Canada. Export office: Four Drive Tractor Co., 15 Whitehall St., New York.

FRICK CO., INC., WAYNESBORO, PA.

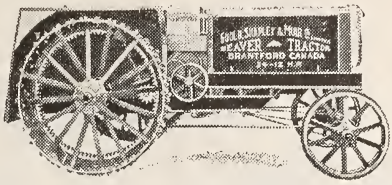
FRICK 12-25.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 24.7 h. p. on belt; recommended for 22-in. to 26-in. threshers; 2 speeds forward, 2.3 and 3.8 m. p. h.; diameter turning circle, 25 ft. Motor: Erd, valve in head, 4 cylinders vertical, 4x6 in., 900 r. p. m.; fuel recommended, kerosene. Lubrication: Circulating splash; oil recommended, Mobiloil "B" in summer, Mobiloil "A" in winter. Bearings: Front wheels, plain; rear axle, babbitted; transmission, jackshaft and fan, Hyatt roller. Transmission: Nuttall enclosed gear, finished and heat treated. Final drive: Open or enclosed bull pinion and gear. Height of drive wheels, 60 in., width 10 in. Pulley: 13 in. diameter, 7 in. face; 900 r. p. m.; controlled through motor clutch, mounted on crankshaft extended; belt speed, 3,060 ft. per min. 2 fuel tanks, 20 gals kerosene, 3 gals. gasoline. Bennett air cleaner. Kingston magneto with impulse starter. Erd governor. Kingston carburetor, 1¼ in. Cooling: Perfex radiator, pump circulation; "Hy-Duty" 20-in. fan; fan belt pulleys, 8x2 in.; flat belt, 9 ft. 2 in. long, 1½ in. wide. Champion spark plugs, ⅞ in., 18 thread. 3 rings to piston, ¼ in. wide, 4 in. diameter. Hitch: Lateral adjustment, 15 in. Tractor dimensions: Length 158 in., width 77 in., height 66 in.; shipping weight 5,800 lbs. 345 cu. ft. packed for export. Branches: Rochester, N. Y., Pittsburgh, Williamsport, Harrisburg and Philadelphia, Pa.; Baltimore, Md.; Charleston, W. Va.; Salisbury, N. C.; Nashville and Knoxville, Tenn.; Trenton, N. J.; Columbia, S. C.; Columbus, O.; Dallas, Tex. Distributors: S. J. Diets, Bloomington, Ill.; Avery Co., Atlanta, Ga.; Card, Adams & Morris, Lincoln, Neb.

GOOLD, SHAPLEY & MUIR CO., LTD., BRANTFORD, ONT.

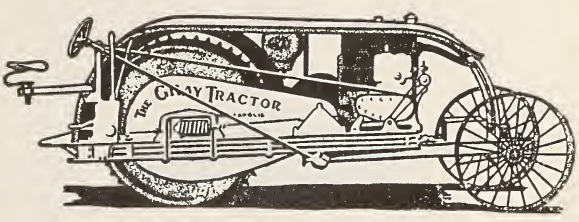
BEAVER 12-24.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 24 h. p. on belt; recommended for 24-in. thresher; 2,400 lbs. pull at plowing speed; 7 speeds forward and reverse; diameter turning circle, 18 ft. Motor: Waukesha, valve in head, 4 cylinders vertical, 4½x6¾ in., 500 to 950 r. p. m.; fuel recommended, gasoline and kerosene. Lubrication: Circulating splash and force feed; oil recommended, Mobiloil BB. Bearings: Transmission, self-aligning, double ball; cooling fan, ball. Transmission: Own make, enclosed friction and gears, finished. Final drive: Open bull pinion and gear. Drive wheels: Height 60 in., width 10 in. Pulley: 14x8 in., 800 r. p. m.; controlled through friction disc off engine flywheel, mounted on friction disc shaft; belt speed 2,600 ft. per min. 2 fuel tanks, 7 gals. gasoline, 14 gals. kerosene. Own make air cleaner. Dixie magneto with impulse starter. Waukesha governor. Kingston carburetor, 1¼ in. Cooling: Perfex radiator, pump circulation; Waukesha 20-in. fan; fan belt pulleys, 8 and 3x2 in.; flat belt, 42 in. long, 1¾ in. wide. Splitdorf spark plugs, ⅞ in. 3 rings to piston, 4½x¼ in. Hitch: Lateral adjustment, 21 in. Tractor dimensions: Length 11 ft. 10 in., width 6 ft. 6 in., height 5 ft. 6 in.; shipping weight 5,800 lbs; 300 cu. ft. packed for export. Branches: Portage la Prairie, Man., Regina, Sask., Calgary, Alta.

GRAY TRACTOR CO., INC., MINNEAPOLIS, MINN.

GRAY 18-36.



A 4-plow tractor with driving drum and 2 steering wheels; 18 h. p. on drawbar, 36 h. p. on belt; recommended for 28-in. thresher; 3,600 lbs. pull at plowing speed; 2 speeds forward, 2½ and 2 m. p. h.; inside diameter turning circle 20 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,250. Motor: Waukesha, L head, 4 cylinders vertical, 4¾x6¾ in., 850 r. p. m.; fuel recommended, gasoline. Lubrication: Circulating splash; oil recommended, Havoline or Gargoyle BB., heavy for summer, medium for winter. Bearings: Front wheels, Timken roller; rear axle, plain phosphor bronze; transmission and jackshaft, Hyatt roller; cooling fan, Hess-Bright. Transmission: Own make, enclosed spur gears, finished. Final drive, enclosed chain. Height of driving drum 54 in., width 54 in. Pulley: 11x8 in., 850 r. p. m.; controlled through motor clutch, mounted on main drive shaft; belt speed 2,447 ft. per min. 1 fuel tank, 34 gals. Bennett dry centrifugal air cleaner. Bosch magneto with impulse starter. Waukesha governor. Bennett carburetor, 1½ in. Cooling: S-J radiator, centrifugal pump circulation; own make 20-in. fan; fan belt pulleys, 8 in. diameter, 2⅜ in. face; flat belt, 73½ in. long, 2 in.

Gray TRACTOR

Built For The Man Who Wants Good Machinery

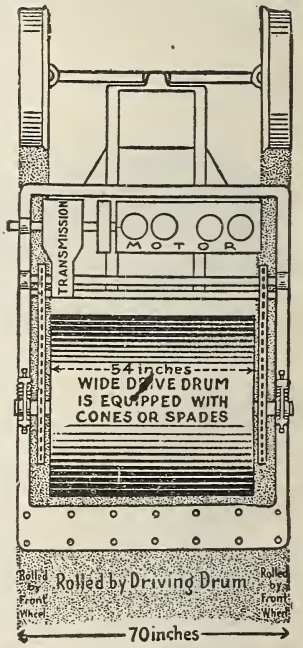
WIDE DRIVE DRUM

Leaves No Ridges or Wheel Tracks in Soft Soil

THE Wide Drive Drum tracks just inside the two front wheels, rolling a strip 70 inches wide. The Gray's total weight, 6200 lbs., is distributed over this 70 inches, so it is impossible for it to pack the soil. This rolling feature makes the Gray itself an implement when doing plowing or seed bed preparation. And no two-drive-wheel tractor provides as much traction surface. Five years in the fields of the Northwest and Southwest have demonstrated it to be practical and useful.

No Differential—No Bevel Gears

No other tractor is built like the Gray. The construction necessary to accommodate the Wide Drive Drum serves two purposes—greater simplicity, and wider usefulness. There are no spokes to break, or become clogged in wet soil. No differential is required, and the transmission uses but six gears—all spur type. No bevel gears are used. The Gray has established a new low record for repair requirements.



We solicit correspondence with dealers equipped to handle a strictly high grade tractor.

GRAY TRACTOR COMPANY, Inc.
267 30th Ave., S. E.
Minneapolis, Minn.

18 Drawbar H. P.
36 Belt H. P.
Weight
6,200 lbs.

wide. Spark plugs: Champion, ⅞ in. S. A. E. regular. 3 rings to piston, 4¾x.250 in. Hitch: Lateral adjustment 66 in., vertical 6 in. Tractor dimensions: Length 14½ ft., width 6 ft. 11 in., height 5 ft. 6 in.; shipping weight 6,544 lbs.; 433 cu. ft. packed for export. Distributor: J. Jouhet & Blain Mistral, Paris, France.

GREAT WESTERN TRACTOR CORP., OMAHA, NEB.
GREAT WESTERN.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; 25 h. p. on drawbar, 35 h. p. on belt; recommended for 28-in. thresher; 4,000 lbs. pull at plowing speed; 2 speeds forward, 3 and 5¼ m. p. h.; diameter turning circle 24 ft.; retail price Jan. 2, 1919, $1,750 f. o. b. factory. Motor: Beaver, valve in head, 4 cylinders vertical, 4¾x6 in., 900 r. p. m.; recommended for gasoline, kerosene or distillate. Internal force feed and splash lubrication. Hyatt roller bearings throughout. Transmission: Own enclosed gears, finished. Final drive: Direct to live axle. Drive wheels 60 in. high, 12 in. wide. Pulley size optional. 3 fuel tanks, kerosene 25 gals., gasoline 5 gals., water 5 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Built-in governor. Kingston 1¾-in. carburetor. Cooling: Modine Spirex radiator, pump circulation; 22-in. fan. 4 rings to pistons, 4¾x¼ in. Lateral hitch adjustment 36 in. Tractor dimensions: Length 152 in., width 72 in., height 65 in.; shipping weight 4,800 lbs.

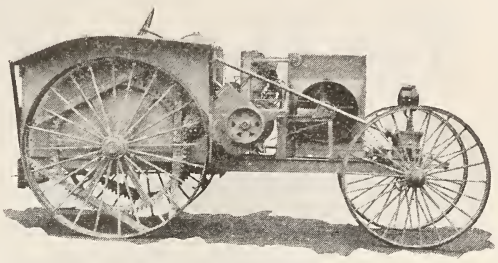
HACKNEY MFG. CO., ST. PAUL, MINN.
HACKNEY AUTO PLOW.

A 3 16-in. plow tractor with 2 drive wheels and 1 steering wheel; 20 h. p. on drawbar, 40 h. p. on belt; 2 speeds forward, 3 and 4½ m. p. h.; 2,500 lbs. pull at plowing speed (3 miles); recommended for 30-in. thresher; turning circle, 32 ft. Motor: Climax, L head, 4 cylinders, vertical, 4¾x7 in.; 750 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Internal force feed; oil recommended, heavy in summer and medium in winter. Bearings: Front and rear wheels, rear axle, transmission and jackshaft, babbitt; cooling fan, ball. Transmission: Own make, enclosed gear, finished. Final drive: Bull pinion and gear, enclosed. Height of drive wheels 5 ft., width 14 in. Pulley: 32x8 in., 250 r. p. m.; controlled through motor clutch; driven through gears, 2 speeds. 2 fuel tanks, 2 and 15 gals. Bennett air cleaner. Dixie magneto with impulse starter. Climax governor. Kingston 1½-in. carburetor. Cooling: Perfex radiator or any other desired, centrifugal pump circulation; Climax 20-in. fan; fan belt pulleys 1½ in. wide, flat belt. Spark plugs: ⅝ in. 4 rings to piston, 4¾x1¼ in. Tractor dimensions: Length 14 ft. 9 in., width 66 in., height 72 in.; shipping weight with plows 8,000 lbs.; 620 cu. ft. packed for export.

HACKNEY MFG. CO., ST. PAUL, MINN.
HACKNEY CORN TRACTOR.

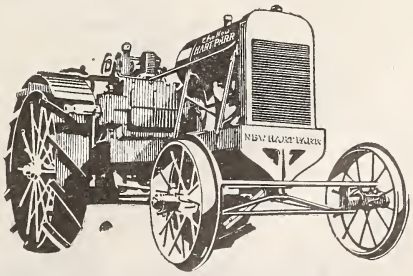
A 2-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; 1 speed forward; turns square corner; recommended for 24-in. thresher. Motor: Field, L head, 4 cylinders, horizontal opposed, 3¾x5 in., 1,000 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Splash and force feed; recommend heavy oil in summer, medium in winter. Bearings: Front and rear wheels, plain; transmission, roller; jackshaft, roller; cooling fan, ball. Transmission: Hackney enclosed friction, all gears finished except bull gears. Final drive: Internal gear on rim, enclosed. Height of drive wheels, 48 in., width 8 in. Pulley: 16x8 in., 1,000 r. p. m.; controlled through independent friction clutch; mounted on crankshaft; belt speed 4,180 ft. per min. 2 fuel tanks, 3 and 20 gals. Bennett air cleaner. Dixie magneto with impulse starter. Field governor. Kingston 1¼-in. carburetor. Cooling: Own make force draught radiator, centrifugal pump circulation; fan belt pulleys, 3 and 6x1¼ in.; flat belt, 48 in. long, 1¼ in. wide. Spark plugs: Champion ½ in. pipe thread. 3 rings to piston, 3¼x¼ in. Hitch: Lateral adjustment 20 in., vertical 15 in. Tractor dimensions: Length 114 in., width 42 in., height 56 in.; shipping weight 3,000 lbs.; 150 cu. ft. packed for export.

HAMILTON GEAR & MACHINE CO., TORONTO, ONT.
HAMILTON 12-22.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 22 h. p. on belt; recommended for 22-in. thresher; 2 speeds forward, 2⅛ and 2⅔ m. p. h.; diameter turning circle, 24 ft. Motor: Erd, valve in head, 4 cylinders vertical, 4x6 in., 850 r. p. m.; fuel recommended, kerosene. Lubrication: Circulating splash; oil recommended, Mobiloil A. Bearings: Front wheels, Timken roller; rear axle, Hyatt roller; transmission, Hyatt and SKF double row; jackshaft, Hyatt self-aligning; cooling fan, ball. Transmission: Own make, selective sliding gear, enclosed, finished. Final drive: Bull pinion and gear, open. Height of drive wheels 60 in., width 10 in. Pulley: 12½x7½ in., 850 r. p. m.; controlled by motor clutch, mounted on crankshaft; belt speed 2,600 ft. per min. 2 fuel tanks, 17 and 3 gals. Bennett centrifugal air cleaner. Kingston magneto with impulse starter. Erd governor. Kingston 1¼-in. carburetor. Cooling: Modine Spirex radiator, centrifugal pump circulation; Erd 18-in. fan; fan belt pulleys 1½x7 in. and 1½x8½ in.; flat belt, 1⅜ in. wide, 6 ft. long. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4x¼ in. Lateral hitch adjustment 31 in. Tractor dimensions: Length 154¼ in., width 64 in., height 81 in.; shipping weight 5,500 lbs.

HART-PARR CO., CHARLES CITY, IA.
NEW HART-PARR.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 30 h. p.; recommended for 28 in. thresher. Operating weight 5,000 lbs.; turning radius 13 ft. Motor: Own, valve in head, 2 cylinders horizontal, 6½x7 in.; normal compression 80 lbs.; 750 r. p. m.; fuel recommended, kerosene. Lubrication: Madison-Kipp force feed oiler. Bearings: Front wheels and rear axle, babbitt; trans-

mission and jackshaft, SKF balls and Hyatt rollers. Transmission: Enclosed gears, 2 speeds forward. Final drive: Spur gear, with spur pinions; gears open. Drive wheels: Diameter 52 in., width 10 in. Pulley: 14x8 in., 750 r. p. m.; driven direct from motor; belt speed 2,750 ft. per minute. 1 fuel tank, 23 gals.; oil capacity 7 pints. No air cleaner. Ignition: K-W magneto with impulse starter. Fly ball governor. Carburetor: Schebler, single bowl, 1½ in. inlet. Cooling: Water, Perfex radiator, pump circulation. Spark plugs: Splitdorf, 1 to cylinder, ½ in. pipe thread, 1 in. extension. 4 rings to piston, diameter 6.5 in., width .312 in. Hitch: 17 in. high, lateral adjustment 48 in. Dimensions: Length over all 141 in., width 83 in., height 60 in.; wheel base 90 in.; shipping weight 5,200 lbs.

JOSHUA HENDY IRON WORKS, SUNNYVALE, CAL.
INVINCIBLE.

A 2-plow tractor with 2 drive wheels and 1 steering wheel; 6 h. p. on drawbar, 15 h. p. on belt; 2 speeds forward; diameter turning circle 12 ft. Motor: Wisconsin, L head, 4 cylinders vertical, 3¾x5 in., 900 r. p. m.; fuel recommended, distillate. Bearings: Wheels, plain; transmission and jackshaft, Timken roller; cooling fan, ball. Friction transmission. Final drive: Bull pinion and gear, open. Height of drive wheels 42 in., width 12 in. Pulley: 900 r. p. m., mounted on crankshaft. Capacity of fuel tank 15 gals. Bennett centrifugal air cleaner. Bosch magneto, without impulse starter. Pierce governor. Stromberg 1¼-in. carburetor. Cooling: Flexo radiator, pump circulation; 18-in. fan; fan belt pulleys, 1½ in.; flat belt. Spark plugs, ⅞ in. S. A. E. 3 rings to piston, 3¾x¼ in. Tractor dimensions: Length 13 ft., width 55 in., height 56 in.; shipping weight 5,000 lbs.

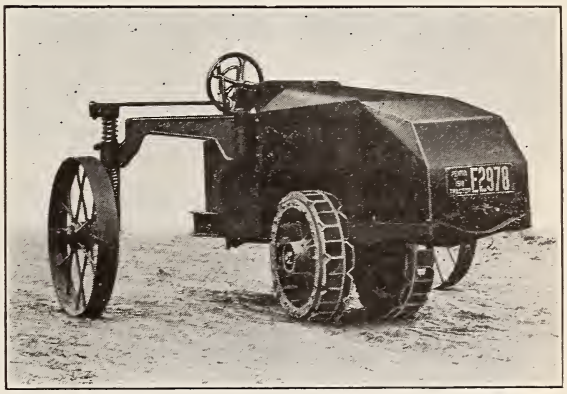
HESSION TILLER & TRACTOR CORP., BUFFALO, N. Y.
WHEAT 12-24.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 24 h. p. on belt; recommended for 28-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2½ and 3¾ m. p. h.; diameter turning circle 11½ ft.; retail price Jan. 1, 1919, $1,695 f. o. b. factory. Motor: Erd, 4 cylinders vertical, valve in head, 4x6 in., 1,000 r. p. m.; recommended for kerosene. Lubrication: Internal force feed and splash. Bearings: Wheels and rear axle, Timken rollers; transmission, Hyatt rollers. Transmission: Foote enclosed gears, finished. Final drive: Bull pinions and gears. Drive wheels 48 in. high, 12 in. wide. Pulley: 12x7 in.; controlled by motor clutch; driven through gears; belt speed 2,600 ft. per min. 2 compartment fuel tank, 3 and 15 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Pickering governor. Kingston 1¾-in. carburetor. Cooling: Perfex radiator, pump circulation; Gakes 20-in. fan; pulleys 7 and 3½x1⅝ in.; flat belt 33¾x1⅜ in. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to pistons, 4x1¼ in. Lateral adjustment of hitch 12 in. Tractor dimensions: Length 144 in., width 62 in., height 58 in.; shipping weight 4,050 lbs.

HICKS TRACTOR CO., MILWAUKEE, WIS.
HICKS 12-25.

A 3-plow tractor with 2 front wheels and 1 central drive belt; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2.4 and 4½ m. p. h.; diameter turning circle 18 ft. Motor: Own, 4 cylinders vertical, L head, 4½x6 in., 800 r. p. m.; recommended for kerosene. Lubrication: Internal pressure; oil recommended, Mobiloil B in summer, A in winter. Bearings: New Departure balls in front wheels, jackshaft and fan; Hess-Bright balls in rear axle and transmission. Transmission: Own make, spur gears, enclosed and finished. Final drive: Live axle to divided rear belt. Drive belt 54 in. on ground, 16 in. wide. Pulley: 12x6½ in., 725 r. p. m. in either direction; controlled by motor clutch; driven through gears; belt speed 2,300 ft. per min. 2 fuel tanks, 3 and 20 gals. Bennett centrifugal air cleaner. Ignition: Wagner 2-unit generator and starting motor. Wagner electric governor. Bennett 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; 20-in. fan; 2½-in. flat belt. Splitdorf spark plugs, ⅞ in. Lateral adjustment of hitch 12 in., vertical 12 in. Tractor dimensions: Length 98 in., width 68 in., height 58 in.

HOLLIS TRACTOR CO., PITTSBURGH, PA.
HOLLIS 15-25.



A 3-plow tractor with 2 drive and steering wheels in front, and 2 supporting wheels adjustable from rear to side, depending on crops and contour; 15 h. p. on drawbar, 25 h. p. on belt; recommended for 26-in. thresher; 3,000 lbs. maximum pull at drawbar; 3 speeds forward, 1¾, 2½ and 7 m. p. h.; diameter turning circle 9 ft.; retail price Jan. 1, 1919, $1,375 f. o. b. factory. Motor: Light, 4 cylinders vertical, L head, 3¼x4½ in., 1,650 r. p. m.; recommended for kerosene or gasoline. Lubrication: Circulating splash and pressure; Mobiloil BB recommended for summer, A for winter. Bearings: Plain in wheels and transmission; Hyatt rollers in jackshaft and fan. Transmission: Planetary, own make, enclosed and finished. Final drive, gear to live axle. Drive wheels 30 in. high, 9 in. wide. Pulley: 12x6 in., 800 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 2,500 ft. per min. 2 fuel tanks, 1 and 30 gals. Bennett centrifugal air cleaner. Dixie magneto. Pierce governor. Zenith 1-in. carburetor. Cooling: Bremer radiator, pump circulation; Hy-Duty 16-in. fan; pulleys 4 and 2x1½ in.; flat belt 1½ in. wide, 24 in. long. Champion spark plugs, ⅞ in. S. A. E. 3 rings to pistons, 3¼x3-16 in. Lateral hitch adjustment 22 in.,

The Best of Many Tractors

IN the 20 years that we have been building farm tractors, experimentally and commercially, we have built every type and size and have observed their operation under every condition that is to be encountered on American farms.

Finally we abandoned all but the Huber Light Four. It is the unit best adapted to every size of farm—the one that gets most work from the least metal, fuel, and labor.

American farmers have approved our judgment. Hundreds of Hubers everywhere are enthusiastically praised by their owners.

The Huber is so simple a boy can run it; light enough to work on ploughed ground without packing it down; turns sharply and keeps right side up on hills; powerful enough to pull three 14-inch plows set 14″ deep; so lightly and strongly built that it does the most work on the least fuel.

It furnishes economical power for the feed grinder, buzz saw, corn husker, ensilage cutter and hay baler—burns gasoline, kerosene, or distillate.

American farmers know Huber products favorably and have known them for 40 years. Established good will; enthusiastic owner support; strong advertising policies; protected price; parts depots in leading centers everywhere—these factors make it easy going for Huber dealers. Last year they sold six times as many Hubers as they did the year before. They will multiply their volume again this year.

A few good territories are still open. If, as a dealer, you measure up to a high standard, write now!

THE HUBER MANUFACTURING COMPANY

658 Center Street **Marion, Ohio**

Manufacturers of Agricultural Implements for Over 40 Years

vertical 18 in. Tractor dimensions: Length 136 in., width of body 24 in., including wheels, minimum 40 in., maximum 102 in., height 67 in.; shipping weight 2,900 lbs.; 110 cu. ft. packed for export.

HOLT MFG. CO., PEORIA, ILL.
CATERPILLAR 5-TON 4-PLOW.

A 4-plow tractor driving and steering through 2 tracks; 25 h. p. on drawbar, 45 h. p. on belt; 3,600 lbs. pull at plowing speed; recommended for 32-in. thresher; 3 speeds forward, 1.3, 2.6 and 4.9 m. p. h. Motor: Modified class B Liberty truck model, 4 cylinders vertical, valve in head, 4¾x6 in., 900 r. p. m.; pressure lubrication capable of operating on 50 per cent grade. Hyatt roller bearings in transmission and track. Transmission: Enclosed, selective gears. Final drive: Two spur gear reduction from steering clutch to track sprockets. Pulley: 8-in. face located at rear of machine; belt speed 2,700 ft. per min. Fuel capacity 35 gals. High tension magneto with impulse starter; provision for mounting lighting generator and starting motor. Cooling: Copper tube radiator, pump circulation; belt-driven fan. Hitch: Both pendulum drawbar and draw head. Tractor dimensions: Length 124 in., width 63 in., height 64 in.; shipping weight 9,400 lbs.

HOLT MFG. CO., PEORIA, ILL.
CATERPILLAR 10-TON 8-PLOW.

An 8-plow tractor driving and steering through 2 tracks; 40 h. p. on drawbar, 60 h. p. on belt; 6,000 lbs. pull at plowing speed; recommended for 36-in. thresher; 3 speeds forward, 1⅛, 2½ and 3.9 m. p. h. Motor: 4 cylinders vertical, 6½x7 in., 650 r. p. m. Pressure lubrication, motor capable of running on 50 per cent grade. Hyatt roller and ball bearings in transmission; Hyatts in track. Pulley: Located in rear, size for 10-in. belt; speed 2,700 ft. per min. Fuel capacity 46 gals. High tension magneto with impulse starter. Cooling: Copper tube radiator, pump circulation; belt-driven fan. Hitch: Stationary draw head and clevis. Dimensions: Length 146 in., width 80 in., height 81 in.; shipping weight 18,600 lbs.

HOLT MFG. CO., PEORIA, ILL.
CATERPILLAR 45.

A tractor driving and steering through 2 tracks; 25 h. p. on drawbar, 45 h. p. on belt; 4,500 lbs. pull at plowing speed; 2 speeds forward, 1½ and 4 m. p. h.; turning circle 9 ft. Motor: Own, 4 cylinders vertical, valve in head, 6x7 in., 600 r. p. m.; recommended for gasoline or distillate. Lubrication: Madison-Kipp mechanical oiler, internal pressure and splash; recommended oil, Mobiloil B. Bearings: Plain throughout, except fan, which is Hyatt roller. Transmission: Enclosed gears, finished. Final drive: Enclosed gears and chain. Tracks 80 in. on ground, 13 or 30 in. wide. Pulley: 14x9 in., 625 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 2,290 ft. per min. 1 fuel tank, 48½ gals. Donaldson air cleaner. K-W magneto with impulse starter. Own governor. Kingston 1½-in. carburetor. Own radiator, pump circulation. Spark plugs ½ in. 3 rings to pistons, 6x⅜ in. Tractor dimensions: Length 146 in., width 74 in., height 84 in.; shipping weight 13,500 lbs.

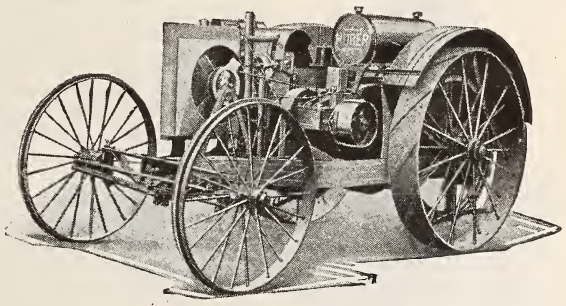
HOLT MFG. CO., PEORIA, ILL.
CATERPILLAR 75.

A tractor with 2 driving tracks and 1 steering wheel; 50 h. p. on drawbar, 75 h. p. on belt; 7,200 lbs. pull at plowing speed; 2 speeds forward, 2 and 4 m. p. h.; diameter turning circle 18 ft. Motor: Own, 4 cylinders vertical, valve in head, 7½x8 in., 550 r. p. m.; recommended for gasoline or distillate. Lubrication: Madison-Kipp mechanical oiler, internal pressure and splash; recommended oil, Mobiloil B. Plain bearings throughout except Hyatt rollers in fan. Transmission: Enclosed gears, finished. Final drive: Enclosed chain and gears. Tracks 74 in. on ground, 24 or 30 in. wide. Pulley: 22x12 in., 460 r. p. m.; controlled by motor clutch driven through gears; belt speed 2,649 ft. per min. 1 fuel tank, 74 gals. Donaldson air cleaner. K-W magneto with impulse starter. Own governor. Kingston 2½-in. carburetor. Own radiator, pump circulation. Spark plugs ½ in. 3 rings to pistons, 7½x7-16 in. Tractor dimensions: Length 240 in., width 104 in., height 120 in.; shipping weight 23,600 lbs.

HOLT MFG. CO., PEORIA, ILL.
CATERPILLAR 120.

A tractor with 2 drive tracks and 1 steering wheel; 70 h. p. on drawbar, 120 h. p. on belt; recommended for 32-in. thresher; 12,600 lbs. pull at plowing speed; 2 speeds forward, 1¼ and 4 m. p. h.; turning circle 25 ft. Motor: Own, 6 cylinders vertical, L head, 7½x8 in., 550 r. p. m.; recommended for gasoline or distillate. Lubrication: Madison-Kipp mechanical oiler, internal pressure and splash; recommended for Mobiloil B. Plain bearings throughout except Hyatt rollers in fan. Transmission: Enclosed gears, finished. Final drive: Enclosed chain and gears. Tracks 74 in. on ground, 24 or 30 in. wide. Pulley: 22x12 in., 460 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,649 ft. per min. 1 fuel tank, 74 gals. Donaldson air cleaner. K-W magneto with impulse starter. Own governor. Kingston 3-in. carburetor. Own radiator, pump circulation. Spark plugs ½ in. 3 rings to pistons, 7½x⅜ in. Tractor dimensions: Length 252 in., width 104 in., height 120 in.; shipping weight 24,800 lbs.

HUBER MFG. CO., MARION, O.
HUBER 12-25.



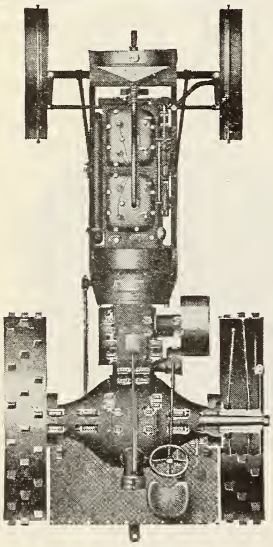
A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar 25 h. p. on belt; recommended for 22-in. thresher; 2,500 lbs. pull at plowing speed 2 speeds forward, 2.35 and 3.84 m. p. h.; turning circle 24 ft. Motor: Waukesha, 4 cylinders vertical, L head, 4¼x5¾ in., 900 r. p. m.; recommended for gasoline or kerosene. Lubrication: Circulating splash; heavy oil for summer, light for winter. Bearings: Plain in wheels; rollers and balls in transmission; rollers in jackshaft and fan. Transmission: Enclosed gears, finished. Final drive: Open bull pinions and gears. Drive wheels 60 in. high, 10 in. wide. Pulley: 13x7 in., 900 r. p. m.; controlled by motor clutch; mounted on crankshaft extension; belt speed 3,063 ft. per min. 2 compartment fuel tank, 3 and 21½ gals. Periscope air intake. Kingston magneto with impulse starter . Waukesha governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator,

ILLINOIS

The Master-Drive 3-4 Plow Tractor of America

IN the Middle West, the Illinois Super-Drive Tractor has been handling four 14-inch plows running from six to eight inches deep in both stubble and sod at a plowing speed of two and one-half to three miles per hour. With special lugs, the Illinois will operate perfectly in rice land and troublesome sandy soils. For road work the speed can be increased up to 15 M. P. H. by simply changing cross-over gear.

Unit Construction



Live Axle Drive
16 Super Spring Cushions
Hyatt Roller Bearings

The Illinois Super-Drive Tractor is best designed, best engineered and best built of any farm tractor. It has many new and exclusive features that make it a wonder for power, reserve power, dependability.

The Illinois Tractor Has Many Superior Features

UNIT CONSTRUCTION which eliminates the possibility of any part getting out of alignment.

TOTALLY ENCLOSED TRANSMISSION, DIFFERENTIAL AND PLANETARY FINAL DRIVE running constantly in oil, which deliver 20% more engine power to drawbar than any other driving principle in tractor use.

ENCLOSED GEARS and BEARINGS which prevent dirt and dust from working into parts and eliminate excessive friction.

FINAL PLANETARY DRIVE which relieves strain and eliminates breakage of gear teeth.

EIGHT POINTS OF DRIVING CONTACT which give even distribution of driving power to rims of wheels.

SUPER-DRIVE SPRING CUSHIONS which prevent destructive backlash and jars to mechanism and operator. These save damage to tractor and save money for Illinois Super-Drive Tractor owners.

This is the Tractor Farmers Have Waited For

And the Illinois has many other big features such as powerful, slow speed, kerosene burning engine, quick detachable lugs for driving members, easy accessible cross-over gears, extra roomy platform, convenient controls, shock absorbing spring on drawbar, etc.

From the standpoint of performance, power, power reserve, dependability and low operation and upkeep costs, the Illinois Super-Drive Tractor is the lowest priced tractor in the world. Send for literature.

ILLINOIS TRACTOR CO.

BLOOMINGTON, ILL. U.S.A.

MORE FROM THE SOIL
ILLINOIS
SUPER-DRIVE
WITH LESS TOIL

pump circulation; Oakes 20-in. fan; pulleys 8¾x1¾ in., flat belt, 1½ in. wide. Wright spark plugs, ⅞ in. S. A. E. 3 rings to pistons, 4¼x¼ in. Lateral adjustment of hitch 48 in. Tractor dimensions: Length 150 in., width 80½ in., height 69 in.; export gross shipping weight 6,770 lbs.; 254.47 cu. ft. packed for export.

ILLINOIS TRACTOR CO., BLOOMINGTON, ILL.

ILLINOIS 18-36.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 32-in. thresher; 2 speeds forward, 2½ and 3¼ m. p. h.; diameter turning circle 22 ft.; retail price Jan. 1, 1919, $2,250 f. o. b. factory. Motor: Climax, 4 cylinders vertical, L head, 5x6½ in., 800 r. p. m.; recommended for kerosene. Lubrication: Internal pressure; Mobiloil B recommended in summer, A in winter. Bearings: Hyatt rollers in wheels, rear axle, transmission and final drive; New Departure balls in fan. Transmission: Foote enclosed gears, finished. Final drive: Gear to live axle with planetary reduction gears, all enclosed. Drive wheels 54 in. high, 10 in. wide. Pulley: 14x8½ in., 600 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,250 ft. per min. 2 compartment fuel tank, 18 and 1½ gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Climax governor. Stromberg carburetor. Cooling: Modine radiator, pump circulation; 22-in. Oakes fan; flat belt 2 in. wide. Spark plugs ⅞ in. S. A. E. 3 rings to pistons, 5x¼ in. Lateral hitch adjustment 12 in. Tractor dimensions: Length 142 in., width 72 in., height 60 in.; shipping weight 5,000 lbs.; 360 cu. ft. packed for export.

IMPERIAL MACHINE CO., MINNEAPOLIS, MINN.

IMPERIAL 40-70.

A 10 to 12-plow tractor with 2 drive wheels and 2 steering wheels; 40 h. p. on drawbar, 70 h. p. on belt; recommended for 40-in. thresher; 7,400 lbs. pull at plowing speed, 2½ m. p. h.; diameter turning circle 30 ft.; retail price Jan. 1, 1919, $4,500 f. o. b. factory. Motor: Own, 4 cylinders horizontal opposed, valve in head, 7½x9 in., 400 r. p. m.; recommended for gasoline or kerosene. Lubrication: Detroit 12 feed mechanical oiler; recommended oil, Standard gas engine or Mobiloil B. Bearings: Plain throughout, except cooling fan, with rollers and Bantam thrust balls. Transmission: Own enclosed gears, high speed gears cut, low speed rough. Final drive: Open bull pinions and gears. Drive wheels 96 in. high, 30 in. wide. Pulley: 30x12 in., 400 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 3,140 ft. per min. 2 fuel tanks, 70 and 18 gals. Bennett centrifugal air cleaner. K-W or Dixie magneto with impulse starter. Governor: Either own enclosed or 1-in. Pickering. Kingston 2-in. dual carburetor. Cooling: Tube and plate radiator, pump circulation; 36-in. 4-blade fan; flat belt 10 ft. long, pulleys 2 in. wide. Splitdorf spark plugs, ⅞ in. S. A. E. Four rings to pistons, 7½x½ in.—.002 in. Lateral hitch adjustment 3 ft. Tractor dimensions: Length 215 in., width 110 in., height 135 in.; shipping weight 20,800 lbs.

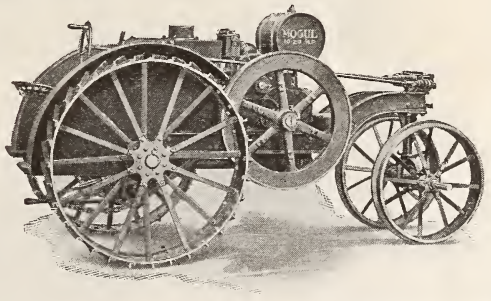
INTERNATIONAL HARVESTER CO., CHICAGO.

INTERNATIONAL 8-16.

A 2-plow tractor with 2 drive wheels and 2 steering wheels; 1,200 lbs. pull at plowing speed; 3 speeds forward, 1.8, 2½ and 4 m. p. h.; retail price Jan. 1, 1919, $975 f. o. b. factory. Motor: IHC 4 cylinders vertical, valve in head, 4x5 in., 1,000 r. p. m.; recommended for kerosene, distillate and gasoline. Lubrication: Madison-Kipp mechanical oiler and splash; list of recommended oils furnished on request. Bearings: Rollers in wheels, transmission and jackshaft. Transmission: Enclosed gears, finished. Final drive: Open roller chain. Drive wheels 40 in. high, 12 in. wide. Pulley: 12¼x8½ in., 650 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,080 ft. per min. 2 fuel tanks, 10 and 1 gal. Strainer air cleaner. High tension magneto with impulse starter. Own enclosed governor. Ensign carburetor. Enclosed radiator, thermo-syphon circulation. Lateral adjustment of hitch from wheel to wheel, vertical 6 in. Tractor dimensions: Length 132 in., width 64 in., height 65½ in.; domestic shipping weight 3,300 lbs.; foreign 4,500 lbs. Branches: Aberdeen S. D., Albany, N. Y., Atlanta, Ga., Auburn, N. Y., Aurora, Ill., Baltimore, Md., Billings, Mont., Birmingham, Ala., Bismarck, N. D., Boston, Mass., Buffalo, N. Y., Cedar Falls, Ia., Charlotte, N. C., Chicago, Ill., Cincinnati, O., Cleveland, O., Columbia, S. C., Columbus, O., Council Bluffs, Ia., Crawford, Neb., Davenport, Ia., Denver, Colo., Des Moines, Ia., Detroit, Mich., Dubuque, Ia., East St. Louis, Ill., Eau Claire, Wis., Elmira, N. Y., Evansville, Ind., Fargo, N. D., Ft. Dodge, Ia., Ft. Wayne, Ind., Grand Forks, N. D., Grand Rapids, Mich., Green Bay, Wis., Harrisburg, Pa., Helena, Mont., Hutchinson, Kan., Indianapolis, Ind., Jackson, Mich., Jacksonville, Fla., Kankakee, Ill., Kansas City, Mo., Knoxville, Tenn., Lincoln, Neb., Little Rock, Ark., Los Angeles, Cal., Madison, Wis., Mankato, Minn., Mason City, Ia., Memphis, Tenn., Milwaukee, Wis., Minneapolis, Minn., Minot, N. D., Nashville, Tenn., New Albany, Ind., New Orleans, La., Ogdensburg, N. Y., Oklahoma City, Okla., Omaha, Neb., Parkersburg, W. Va., Parsons, Kan., Peoria, Ill., Philadelphia, Pa., Pittsburgh, Pa., Portland, Ore., Quincy, Ill., Richmond, Ind., Rockford, Ill., Saginaw, Mich., St. Cloud, Minn., St. Joseph, Mo., St. Louis, Mo., Salina, Kan., Salt Lake City, Utah, San Francisco, Cal., Sioux City, Ia., Sioux Falls, S. D., South Bend, Ind., Spokane, Wash., Springfield, Ill., Springfield, Mo., Terre Haute, Ind., Toledo, O., Topeka, Kan., Watertown, S. D., Wichita, Kan., Winona, Minn., Richmond, Va.

INTERNATIONAL HARVESTER CO., CHICAGO.

MOGUL 10-20.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 1,800 lbs. pull at plowing speed; recommended for 20-in. thresher; 2 speeds forward, 2 and 2½ m. p. h.; diameter turning circle 20 ft.; retail price Jan. 1, 1919, $1,125 f. o. b. factory. Motor: IHC 1 cylinder horizontal, valve in head, 8½x12 in., 400 r. p. m.; recommended for kerosene, distillate and gasoline. Lubrication: Madison-Kipp force feed oiler; list of recommended oils furnished on request. Bearings: Rollers in rear axle and transmission. Transmission: Enclosed gears, finished. Final drive: Open chain. Drive wheels 54 in. high, 10 in. wide. Pulley: 20x10½ in., 400 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 2,090 ft. per min. 1 fuel tank, 13 gals. Strainer type air cleaner. High tension magneto with impulse starter. Own governor and carburetor. Hopper cooling system.

The Tractor to Sell

Success in selling tractors rests on one foundation, and one only—Satisfied Customers.

A tractor user is satisfied only when his machine does all the work he bought it to do, enables him to put in and harvest his crops on time, saves money for him, and does its work as well or better than any other tractor in the neighborhood. These are the points that a dealer must keep in mind when choosing a tractor to sell.

International and Titan Kerosene Tractors

stand today on their records. They are doing the work that thousands of American farmers bought them to do—all of it—at drawbar and belt. Operating on kerosene or even cheaper fuel, they save money at every turn of the fly wheel. They compare favorably with any other tractors, both in amount and quality of work done and in the economy of doing that work.

Remember—International and Titan tractors have behind them a farm machine experience of nearly a century, twelve years of practical tractor experience and the resources of a $140,000,000 organization that believes in Service first, last, and all the time.

The dealer who gets a contract for these machines can begin to sell tractors at once, because the business is already built up, the tractors already have the approval of farmers, and each International tractor sold helps him to sell others. A letter to the address below will bring full information promptly.

International Harvester Company of America

(Incorporated)

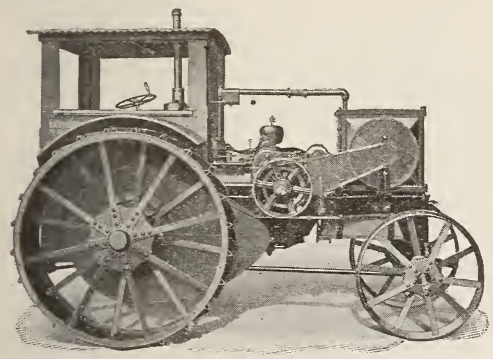
Chicago USA

Lateral adjustment of hitch from wheel to wheel, vertical 11 in. Tractor dimensions: Length 135 in., width 56 in., height 70 in.; shipping weight 5,500 lbs.

INTERNATIONAL HARVESTER CO., CHICAGO. TITAN 10-20.

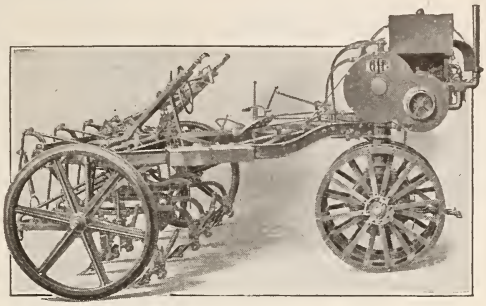
A 3-plow tractor with 2 drive wheels and 2 steering wheels; 1,800 lbs. pull at plowing speed; recommended for 20-in. thresher; 2 speeds forward, 1.85 and 2½ m. p. h.; turning circle 28 ft.; retail price Jan. 1, 1919, $1,225 f. o. b. factory. Motor: IHC 2 twin horizontal cylinders, valve in head, 6½x8 in., 500 r. p. m.; recommended for kerosene, distillate and gasoline. Lubrication: Madison-Kipp force feed oiler. Transmission: Enclosed gears, finished. Final drive: Open chain. Drive wheels 54 in. high, 10 in. wide. Pulley: 20x8½ in., 500 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 2,615 ft. per min. 1 fuel tank, 16 gals. Strainer type air cleaner. High tension magneto with impulse starter. Own flyball governor and mixer. Tank cooling system. Tractor dimensions: Length 147 in., width 60 in., height 66¾ in.; shipping weight 5,525 lbs.; 230 cu. ft. packed for export.

INTERNATIONAL HARVESTER CO., CHICAGO. INTERNATIONAL 15-30.



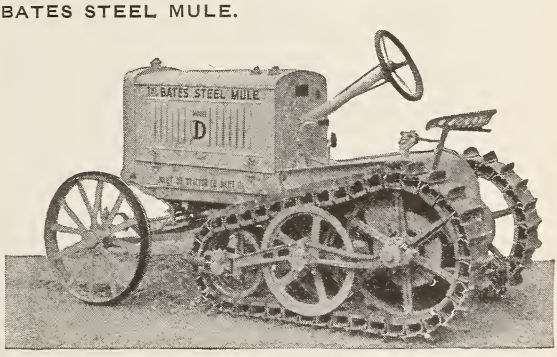
A 4-plow tractor with 2 drive wheels and 2 steering wheels; 2,350 lbs. pull at plowing speed; recommended for 28-in. thresher; 2 speeds forward, 1.8 and 2.4 m. p. h.; turning circle 38 ft.; retail price Jan. 1, 1919, $2,100 f. o. b. factory. Motor: IHC 4 cylinders horizontal, valve in head, 5¼x8 in., 575 r. p. m.; recommended for kerosene, distillate and gasoline. Lubrication: Madison-Kipp force feed oiler; list of recommended oils furnished on request. Transmission: Enclosed gears, finished. Final drive: Enclosed roller chain. Drive wheels 66 in. high, 14 in. wide. Pulley: 18x9 in., 575 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 2,700 ft. per min. 1 fuel tank, 24 gals. Own air cleaner. High tension magneto with impulse starter. Own flyball governor and mixer. Enclosed radiator, pump and thermo-syphon circulation. Tractor dimensions: Length 160 in., width 80 in., height 118 in., including canopy; shipping weight 8,700 lbs.; 490 cu. ft. packed for export.

INTERNATIONAL HARVESTER CO., CHICAGO. INTERNATIONAL MOTOR CULTIVATOR.



A 2-row power cultivator with 2 drive wheels and 2 cultivator wheels. Approximately 6 h. p. on drawbar, 12 h. p. on belt.; 1 speed forward, 2½ m. p. h.; operating weight 3,400 lbs.; turning radius about 7 ft. Motor: LeRoy, 4-cylinder, vertical, 3½x4½ in.; normal compression 65 lbs.; 1,000 r. p. m.; recommended fuel, gasoline; recommended lubricating oil, Stanolind or equal. Lubrication: Forced lubrication by means of pump combined with splash system. Bearings: Front and rear wheels, plain; transmission shaft, loose bronze. Transmission: Enclosed gears running in oil, no differential required. Final drive: Vertical shaft and bevel gears. Drive wheels: 36 in. high, 8 in. wide, placed 8 in. apart. Pulley: 8x8 in., 1,000 r. p. m., controlled by steel disk friction clutch, driven through transmission. 1 fuel tank, 5 gals. Oil capacity, approximately 2 quarts. Air cleaner: Vertical pipe. Ignition: Dixie high tension magneto, no batteries. Own governor, own carburetor. Cooling: Water; own radiator, thermo-syphon circulation. Frame: Triangular, mounted rigidly front and rear. Dimensions: Length over all, approximately 120 in., width 84 in., height 72 in.; wheel base 72 in. Shipping weight 3,500 lbs.

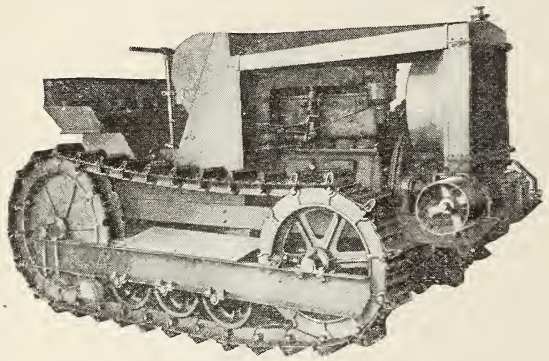
JOLIET OIL TRACTOR CO., JOLIET, ILL. BATES STEEL MULE.



A 3 to 4-plow tractor with 2 driving tracks and 2 steering wheels; 16 h. p. on drawbar, 25 h. p. on belt; recommended for 28-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2.3 and 3.5 m. p. h.; outside diameter turning circle, 16 ft. Motor: Erd, valve in head, 4 cylinders vertical, 4x6 in., 900 r. p. m.; fuel recommended, distillate, kerosene or gasoline. Circulating splash lubrication. Timken roller bearings throughout except cooling fan, which has Hyatt rollers. Transmission: Own make, enclosed gears, finished. Final drive: Spur pinions and gears, enclosed. Length of track on ground 50 in., width 10 in. Pulley: 12x8 in., 735 r. p. m.; controlled by motor clutch, driven through gears; belt speed 2,210 ft. per min. 2 fuel tanks, 2 and 20 gals. Bennett Centrifugal air cleaner. Eisemann

magneto with impulse starter. Pickering governor. Bennett 1½-in. carburetor. Cooling: Modine radiator, pump circulation; Oakes 18-in. fan; fan belt pulleys, 3½x1¾ in.; flat belt, 14 in. to centers and 1½ in. wide. ⅞ in. spark plugs. Hitch: Lateral adjustment 24 in. Tractor dimensions: Length 104 in., width 62 in., height 58 in.; 220 cu. ft. packed for export. Branches and distributing points: Kansas City, Mo., Marshalltown, Ia., Janesville, Wis., Minneapolis, Minn., Seattle, Wash., Los Angeles and Stockton, Cal., Birmingham, Ala., Tulsa, Okla., Indianapolis, Ind., Cleveland, O., Lansing, Mich., Salt Lake City, Utah, Portland Ore., New Orleans, La.

J. T. TRACTOR CO., CLEVELAND, O.
J. T.



A 3 to 4-plow tractor driving and steering through 2 tracks; 16 h. p. on drawbar, 40 h. p. on belt; recommended for 30-in. thresher; 3,200 lbs. pull at plowing speed; 3 speeds forward, 1¼, 2½ and 5 m. p. h.; diameter turning circle 12 ft.; retail price Jan. 1, 1919, $2,500 f. o. b. factory. Motor: Chief, 4 cylinders vertical, valve in head, 4¾x6 in., 800 to 1,000 r. p. m.; recommended for kerosene. Lubrication: Internal force feed. Standard tractor oil recommended. Bearings: Hyatt rollers in track wheels and rear axle; balls in transmission and fan; Bock rollers in jackshaft. Transmission: Detroit enclosed gears, finished. Final drive: Enclosed spur pinions and gears. Tracks 74 in. long on ground, 9 in. wide normally. Pulley: 10x8 in., 1,000 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 2,600 ft. per min. 2 fuel tanks, 25 and 2 gals. Bennett centrifugal air cleaner. K-W high tension magneto with impulse starter. Chief governor. Own 1½-in. carburetor. Cooling: Bremer radiator, pump circulation; 20-in. fan, 2-in. flat belt. Champion spark plugs, ⅞ in. S. A. E. 3 rings to pistons, 4¾x5-16 in. Lateral hitch adjustment 34 in., vertical 20 in. Tractor dimensions: Length 126 in., width 60 in., height 62 in.; shipping weight 6,000 lbs.

KANSAS CITY HAY PRESS CO., KANSAS CITY, MO.
PRAIRIE DOG.

A 2-plow tractor with 1 drive wheel and 2 steering wheels; 9 h. p. on drawbar, 18 h. p. on belt; 1,500 lbs. pull at plowing speed; 2 speeds forward, 2.7 and 6 m. p. h.; recommended for 28-in. thresher; turning circle 26 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,150. Motor: Waukesha, L head, 4 cylinders vertical, 3¾x5¼ in., 950 r. p. m.; fuel recommended, gasoline. Lubrication: Circulating splash; oil recommended, Mobiloil A and B. Bearings: Front wheels, ball-cup and cone; rear wheels, transmission and jackshaft, Hyatt rollers; cooling fan, balls. Transmission: Own make, enclosed gears, finished. Final drive: Enclosed bull pinion and gear. Height of drive wheels 48 in., width 20 in. Pulley: 10x6½ in., 950 r. p. m.; controlled by motor clutch; driven through gears; belt speed, 2,489 ft. per min. 1 fuel tank, 12 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Waukesha governor. Bennett 1-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes 18-in. fan; fan belt pulleys 6x2½ in.; flat belt. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to piston, 3¾x¼ in. Hitch: Lateral adjustment 28 in. Tractor dimensions: Length 156 in., width 74 in., height 65 in.; shipping weight 3,400 lbs.

KARDELL TRACTOR & TRUCK CO., ST. LOUIS, MO.
KARDELL UTILITY.

A 2-plow tractor with 2 drive wheels and 2 steering wheels; 8 h. p. on drawbar, 16 h. p. on belt; 2 speed changes forward, 1½ to 2½ and 3 to 6 m. p. h.; retail price Jan. 1, 1919, $985 f. o. b. factory. Motor: Own, 4 cylinders vertical, 3¾x4¼ in., 1,000 r. p. m.; recommended for kerosene or gasoline. Force feed lubrication to main bearings and splash. Bearings: Timken rollers in front wheels; Hyatt rollers and Gurney balls in transmission and rear axle. Transmission: Enclosed gears, always in mesh, cut and hardened. Final drive: Direct to live axle. Drive wheels 48 in. high, 12 in. wide, reversible so as to reduce tread from 56 in. to 40 in. over all. Pulley: 9x6 in., 1,000 r. p. m.; driven through gears; belt speed 2,350 ft. per min. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Bennett carburetor. Cooling: Honeycomb radiator, thermosyphon circulation; water capacity 10 gals. Tractor dimensions: Length 98 in., width normal 56 in., wheels reversed 40 in., height 52 in.; shipping weight approximately 2,300 lbs.

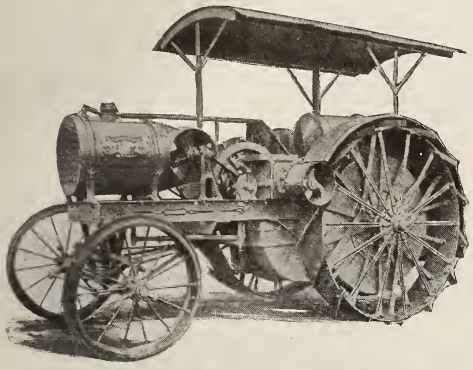
KARDELL TRACTOR & TRUCK CO., ST. LOUIS. MO,
KARDELL 4-IN-1.

A 3-plow tractor with 2 drive wheels in front and 1 non-driving wheel in the rear; 20 h. p. on drawbar, 32 h. p. on belt; 2,500 lbs. pull at plowing speed; 2 speeds forward, 2½ and 5½ m. p. h.; operating weight 5,000 lbs.; turning radius 18 ft.; retail price $2,250 f. o. b. factory. By attaching truck frame and wheels, may be converted into truck. Motor: Waukesha, model N, L head, 4 cylinders vertical, 4½x5¾ in.; normal compression 65 lbs.; 900 r. p. m.; recommended fuel, gasoline. Lubrication: Circulating splash. Bearings: Wheels, plain; transmission and jackshaft, Hyatt high duty rollers. Transmission: Enclosed forged gears, 2 speeds forward. Final drive: Chain. Drive wheels: 60 in. high, 12 in. wide. Pulley: 18x4 in., 335 r. p. m.; controlled by independent friction clutch; driven through transmission; belt speed 1,500 ft. per minute. 2 fuel tanks, 16 and 2 gals. capacity. Air cleaner: Bennett, centrifugal. Ignition: Dixie high tension magneto with impulse starter. Carburetor: Bennett, single bowl, 1¼ in. inlet; mixture heated from exhaust. Cooling: Water; Eureka radiator, pump circulation. Spark plugs: Splitdorf, ⅞ in., 18 threads to inch. Hitch: 16 in. normal height; lateral adjustment 26 in., vertical adjustment 6 in. Frame spring mounted in front, solid in rear. Dimensions: Length over all 158 in., width 84 in., height 74 in.; wheel base 104 in.; shipping weight 5,100 lbs.

KECK-GONNERMAN CO., MT. VERNON, IND.
KECK-GONNERMAN 12-24.

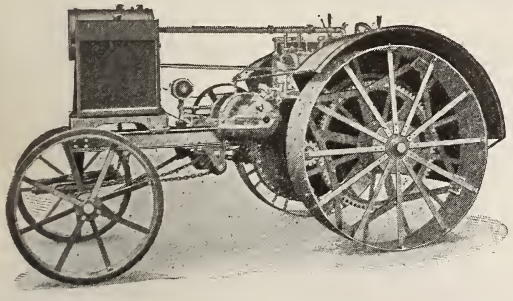
A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; 2,300 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 3½ m. p. h.; thresher recommended, 24x40 in.; turning circle, 20 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,500. Motor: Own make, valve in head, horizontal

twin, 6½x8 in., 650 r. p. m.; fuel recommended, kerosene. Iubrication: Circulating splash and internal force feed; oil recommended, Standarlene I for both summer and winter. Plain bearings throughout. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gears, enclosed. Height of drive wheels 61 in., width 12 in. Pulley: 12x8 in., 650 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 2,700 ft. per min. 2 fuel tanks, 23 and 3 gals. Bennett centrifugal air cleaner. Bosch magneto with



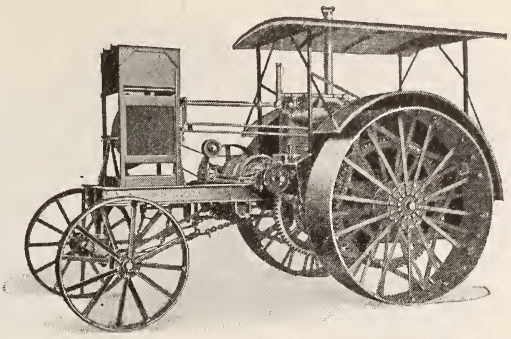
impulse starter. Own make governor. Schebler 2-in. carburetor. Cooling: Own make radiator, centrifugal pump circulation; 2 18-in. fans; diameter and width of fan belt pulleys, 3¼x4 and 3½x6 in.; flat belt, 6 ft. long and 3 in. wide. Champion spark plugs, ½ in. regular. 4 rings to piston, 6¼x5-16 in. Hitch: Lateral adjustment 36 in. Tractor dimensions: Length 150 in., width 75 in., height 97 in.; shipping weight 6,500 lbs. Distributors: Weber Implement & Automobile Co., St. Louis, Mo. and Bloomington, Ill.; W. G. Rush, Streator, Ill.; Ostner Mercantile Co., Charleston, Mo.

KINNARD & SONS MFG. CO., MINNEAPOLIS, MINN. FLOUR CITY JUNIOR 14-24.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 24-in. thresher; 2 speeds forward, 2.2 and 3¼ m. p. h. Motor: Own make, valve in head, 4 cylinders vertical, 5x5 in., 800 r. p. m.; fuel recommended, kerosene. Circulating splash lubrication. Transmission: Own make, enclosed gears, finished. Height of drive wheels 60 in., width 14 in. (left) and 12 in. (right). Pulley: 26x7½ in., 320 r. p. m., belt speed 2,175 ft. per min. 1 fuel tank, 2 compartments, 22 gals. Atwater-Kent ignition. Pickering governor. Schebler 1½-in. carburetor. Cooling: Modine radiator, pump circulation. Champion spark plugs, ½ in. 4 rings to piston, 5-16x5 in. Tractor dimensions: Length 152 in., width 84 in.

KINNARD & SONS MFG. CO., MINNEAPOLIS, MINN. FLOUR CITY 20-35.



A 4 to 6-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 28 and 30-in. threshers; 1 speed forward, 2¼ m. p. h. Motor: Own make, valve in head, 4 cylinders vertical, 5¼x6 in., 800 r. p. m.; fuel recommended, kerosene. Circulating splash lubrication. Transmission: Own make, enclosed gears, finished. Height of drive wheels 72 in., width 18 in. Pulley: 28x8 in., 350 r. p. m.; belt speed 2,565 ft. per min. 1 fuel tank, 2 compartments. K-W magneto with impulse starter. Pickering governor. Schebler 1½-in. carburetor. Cooling: Perfex radiator, pump circulation. Champion spark plugs, ½ in. extension. 4 rings to piston, 5-16x5¼ in.

KINNARD & SONS MFG. CO., MINNEAPOLIS, MINN. FLOUR CITY 30-50.

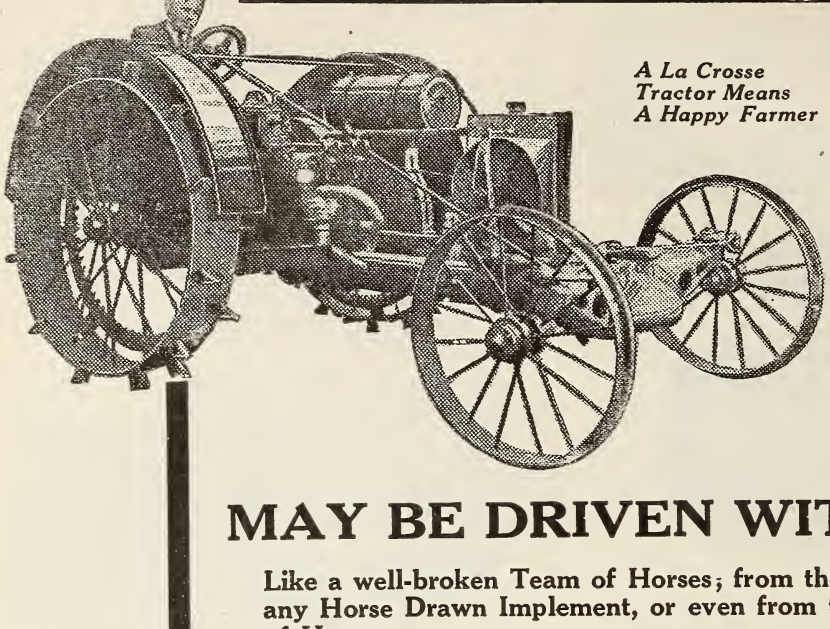
A 6 to 8-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 32 or 34-in. thresher; 1 speed forward, 2¼ m. p. h. Motor: Own make, valve in head, 4 cylinders vertical, 6¼x7 in., 600 r. p. m.; fuel recommended, kerosene. Circulating splash lubrication. Transmission: Own make, enclosed gears, finished. Height of drive wheels 84 in., width 24 in. Pulley: 32x9 in., 275 r. p. m.; belt speed 2,300 ft. per min. 1 fuel tank, 2 compartments. K-W magneto with impulse starter. Pickering governor. Schebler 2-in. carburetor. Cooling: Perfex radiator, pump circulation. Champion spark plugs ½ in. extension. 4 rings to piston, ⅜x6¼ in.

KINNARD & SONS MFG. CO., MINNEAPOLIS, MINN. FLOUR CITY 40-70.

An 8 to 10-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 36-in. thresher and larger; 1 speed forward, 2¼ m. p. h. Motor: Own make, valve in head, 4 cylinders vertical, 7½x9 in., 500 r. p. m.; fuel recommended, kerosene. Circulating splash lubrication. Transmission: Own make, enclosed gears, finished. Height of drive wheels 96 in., width 24 in. Pulley: 34x10 in., 275 r. p. m., belt speed 2,450 ft. per min. 1 fuel tank, 2 compartments. K-W magneto with impulse starter. Pickering governor. Schebler 2-in. carburetor. Cooling: Perfex radiator, pump circulation. Champion spark plugs, ½ in. extension. 4 rings to piston, 7-16x7½ in.

KNICKERBOCKER MOTORS, INC., POUGHKEEPSIE, N. Y.
KNICKERBOCKER JR.

A 1-plow tractor with 2 drive wheels and 2 steering wheels; 10 h. p. on belt; 600 lbs. pull at plowing speed; 1 speed change forward, 2½ m. p. h.; diameter turning circle 24 ft.; retail price f. o. b. factory Jan. 1, 1919,



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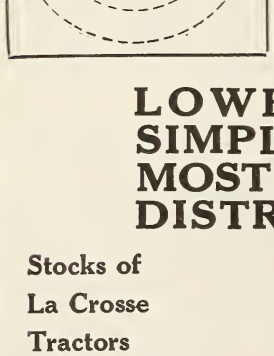
The Most Efficient Light Farm Tractor 12-24 H. P. The Perfect Kerosene Burner

MAY BE DRIVEN WITH LINES

Like a well-broken Team of Horses; from the seat of Binder or any Horse Drawn Implement, or even from the Top of a Load of Hay.

Turns Short in its Tracks—Right or Left



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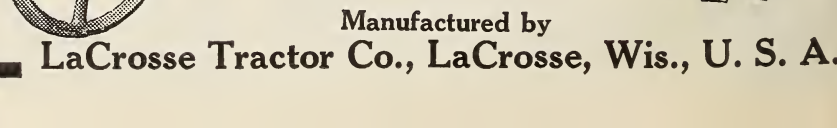
LOWEST OPERATING COST
SIMPLEST—MOST ACCESSIBLE
MOST EXTENSIVELY ADVERTISED
DISTRIBUTORS EVERYWHERE

Stocks of La Crosse Tractors Implements and Repairs Carried By All Distributors For Prompt Service



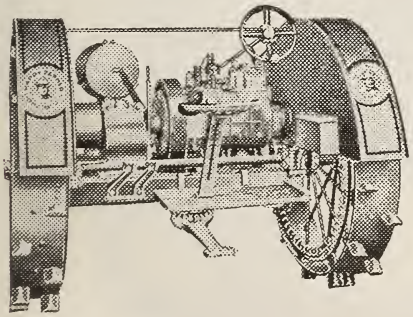
Manufactured by
LaCrosse Tractor Co., LaCrosse, Wis., U. S. A.

$595 Motor: Le Roi, L head, 4 cylinders vertical, 3⅛x4½ in., 1,000 r. p. m.; fuel recommended, gasoline. Circulating splash lubrication. Bearings: Front and rear wheels, plain; transmission, Hyatt and balls; jackshaft, Hyatt; cooling fan, balls. Transmission: Own make, enclosed gear, finished and heat treated. Final drive: Open bull gear and roller pinion. Pulley: 7x5½ in., 800 r. p. m.; controlled by motor clutch; driven through transmission; belt speed 1,465 ft. per min. 1 fuel tank, 10 gals. Orem felt strainer air cleaner. Simms high tension magneto. Zenith 1-in. carburetor. Cooling: G. & O. radiator, thermo-syphon circulation; 12-in. fan; fan belt pulleys, 1 in., flat belt. Champion spark plugs. Lateral hitch adjustment 16 in. Tractor dimensions: Length 10 ft. 6 in., 64 in. wheel base, width 58 in front and 42 in. at rear axle, height 52 in.; shipping weight 1,450 lbs.

KOHL TRACTOR CO., CLEVELAND, O.
KOHL 16-32.

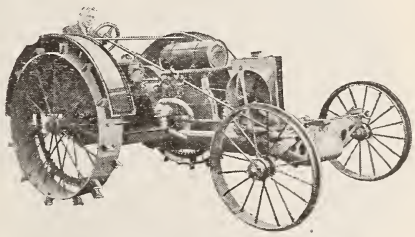
A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 32 h. p. on belt; recommended for 32-in. thresher; 2 speeds forward, 1¾ and 2¾ m. p. h.; turning circle 18 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,200. Motor: Beaver, valve in head, 4 cylinders vertical, 4¾x6 in., 900 r. p. m.; fuel recommended, kerosene. Circulating splash lubrication; oil recommended, medium heavy for summer and medium light for winter. Bearings: Front wheels, rear axle, transmission and jackshaft, Timken roller; cooling fan, ball bearing. Transmission: Nuttall, enclosed gears, finished. Live axle drive. Height of drive wheels 48 in., width 12 in. Pulley: 11x8 in., 900 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,600 ft. per min. 2 fuel tanks, 5 and 15 gals. Orem dry air cleaner. Dixie magneto with impulse starter. Beaver governor. Kingston 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; Beaver 22-in. fan; fan belt pulleys 7¼x1¾ in. and 3x1¾ in.; flat belt 40 in. long, 1¾ in. wide. Champion spark plugs, ⅞-18. 4 rings to piston, 4¾x5-16 in. Hitch: Lateral adjustment 30 in. Tractor dimensions: Length 133 in., width 65½ in., height 66 in.; shipping weight 4,500 lbs.; 138x70x72 in. packed for export.

LA CROSSE TRACTOR CO., LA CROSSE, WIS.
LA CROSSE 12-24 MODEL F.

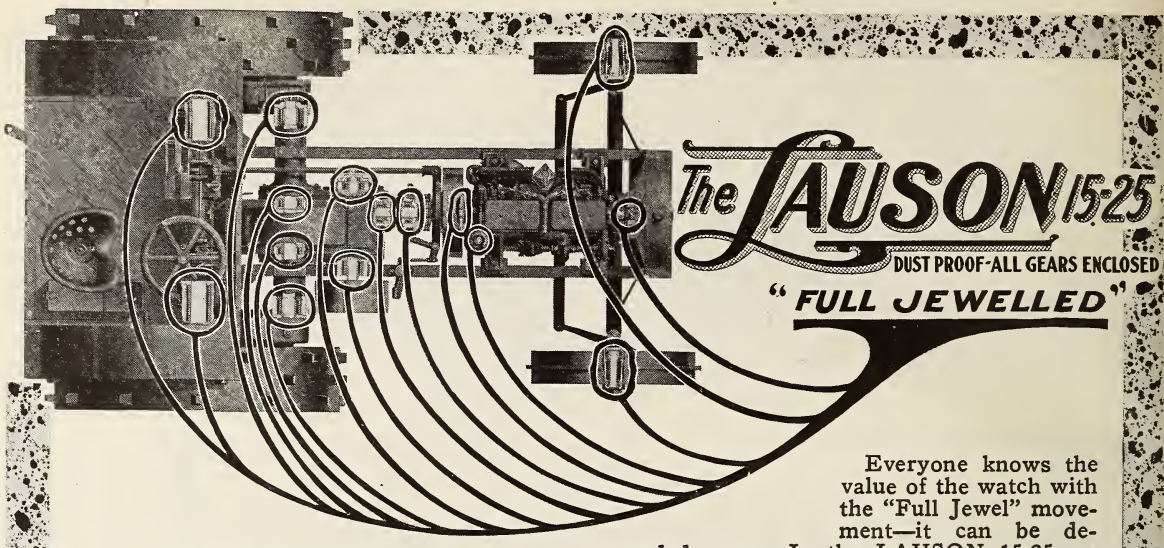


A 3-plow tractor with 2 drive wheels and 1 steering wheel; 27 h. p. on belt; recommended for 24-in. thresher; 2,000 lbs. pull at plowing speed, 2½ m. p. h.; diameter of turning circle, 106 in.; retail price f. o. b. factory Jan. 1, 1919, $1,150. Motor: Own make, valve in head, 2 cylinders twin horizontal, 6x7 in., 750 r. p. m.; fuel recommended, kerosene. Madison-Kipp force feed oiler. Bearings: Front wheel, plain; rear wheels, rear axle, transmission and jackshaft, Hyatt roller; cooling fan, ball. Transmission: Own make, enclosed gears, machined. Final drive: Roller bull pinion and gears, open. Height of drive wheels, 56 in., width 10 in. Pulley: 11x7½ in., 750 r. p. m. Controlled by motor clutch; mounted on crankshaft; belt speed 2,100 ft. per min. 2 fuel tanks, 13 and 2 gals. Own centrifugal air cleaner. Atwater-Kent ignition. Own make governor. Kingston 1½-in. carburetor. Cooling: Modine Spirex radiator, centrifugal pump circulation; Oakes 19-in. fan.; fan belt pulleys, 3x1¼ in.; flat belt, 9 ft. 7¾ in. long, 1¼ in. wide. A. C. Cico spark plugs, ½ in. 4 rings to piston, 6x¼ in. Hitch: Lateral adjustment 36 in. Tractor dimensions: Length 150 in., width 82½ in., height 62 in.; shipping weight 4,000 lbs.; 179 cu. ft. packed for export. Distributors: Meadows Mfg. Co., Pontiac, Ill.; Griffin-La Crosse Tractor Co., Mason City, Ia.; Geo. J. Gardner Co., Indianapolis, Ind.; M. Maloney Co., Inc., Syracuse, N. Y.; J. P. Stoltzfus & Co., Elverson, Pa.; Losch-La Crosse Tractor Co., Jersey Shore, Pa.; R. Dale Clark, Edinburg, Pa.; Townsend Tractor Co., Easton, Md.; H. J. Fox, Milford, N. J.; Ohio Happy Farmer Tractor Co., Bucyrus, O.; Ashton Starke Implement House, Richmond, Va.; W. E. Mueller, Paw Paw, W. Va.; Byron Matthews, Adrian, Mich.; J. B. Gabeline, Burlington, Ia.; Ditmars, Kerr & Co., West Liberty, Ia.; T. G. Northwall Co., Omaha, Neb.; La Crosse Auto Co., Minneapolis, Minn.; St. James-La Crosse Tractor Co., St. James, Minn.; O. K. Hafsos, La Crosse, Wis.; Wisconsin Tractor Sales Co., Oshkosh, Wis.; South Dakota Tractor Co., Watertown, S. D.; La Crosse-Dakota Tractor Co., Grand Forks, N. D.; Minot Motor Sales Co., Minot, N. D.; M. Grewer & Co., Glen Ullin, N. D.; R. S. Kiltz, Great Falls, Mont.; O. E. Peppard, Missoula, Mont.; Gem State Oil & Products Co., Pocatello, Idaho; Colorado-La Crosse Tractor Co., Denver, Colo.; J. H. Cordes, West Alton, Mo.; Burwell-Walker Co., Charlotte, N. C.; Blun-Dimmitt Co., Savannah and Atlanta, Ga.; Machinery Sales Co., Oklahoma City, Okla.; Knoxville-La Crosse Tractor Co., Knoxville, Tenn.; Union Motor Car Co., Memphis, Tenn.; R. A. Bearden, Selma, Ala.; F. E. Wilson, Houston, Tex.; The Simplex Spreader Mfg. Co., Kansas City, Mo.; Northwest Auto Co., Inc., Portland, Ore.; M. C. Cross, Little Rock, Ark.; Happy Farmer Tractor Co., Ltd., Winnipeg, Man.; J. D. Adshead Co., Winnipeg, Man.; Renfrew Machinery Co., Ltd., Renfrew, Ont.; Gaston, Williams & Wigmore, Inc., New York, exporters.

LA CROSSE TRACTOR CO., LA CROSSE, WIS.
LA CROSSE 12-24 MODEL G.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 27 h. p. on belt; recommended for 24-in. thresher; 2,000 lbs. pull at plowing speed, 2½ m. p. h.; diameter turning circle 114 in.; retail price f. o. b. factory Jan. 1, 1919, $1,250. Motor: Own make, valve in head, 2 cylinders twin horizontal, 6x7 in., 750 r. p. m.; fuel recommended, kerosene. Internal force feed lubrication. Bearings: Front and rear wheels, rear axle, transmission and jackshaft, Hyatt rollers; cooling fan, ball bearing. Transmission: Own make, enclosed gears, finished. Final drive: Roller bull pinion and gear, open. Height of drive wheels 56 in., width 10 in. Pulley: 11x7½ in., 750 r. p. m.; controlled by motor clutch; mounted



The LAUSON 15-25

DUST PROOF-ALL GEARS ENCLOSED

"FULL JEWELLED"

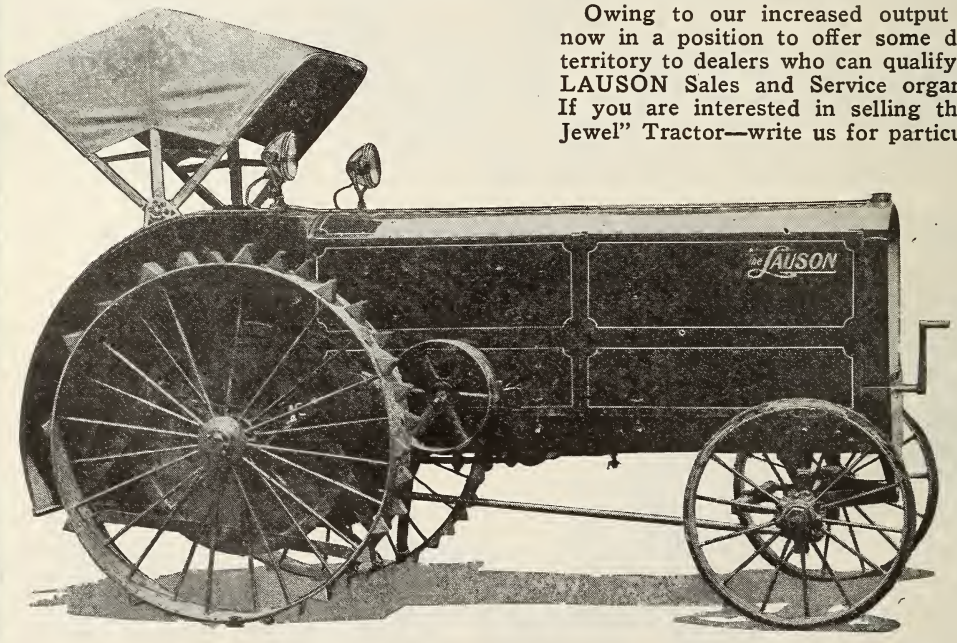
SPECIFICATIONS

Rating — Drawbar H. P. 15; Belt H. P. 25.
Engine — Lauson-Beaver, 4½-inch bore, 6-inch stroke. Valve in head.
Number Cylinders and Cycle—Four.
Normal speed—950 R. P. M.
Lubrication System — Splash and force feed.
Ignition—Dixie Magneto.
Carburetor and Fuel System—Kingston Gravity Feed.
Cooling System—Perfex Radiator.
Belt Pulley—18-inch x 8-inch; 475 R. P. M.
Transmission—Lauson Selective Type—sliding gear. Oil tempered gears.
Number Speeds Forward—Two.
Speed, M. P. H.—Low, 1¾; plowing, 2½; high, 2½.
Number Wheels—Four.
Drive Wheels—54-inch diameter 12-inch face.;
Guide Wheels—32-inch diameter; 6-inch face.
Wheelbase—86-inch.
Tread—52-inch.
Total Weight, less fuel, water, oil and lugs—6,000 pounds.
Shipping Weight with Standard Equipment—6,500 pounds.

Everyone knows the value of the watch with the "Full Jewel" movement—it can be depended upon. In the LAUSON 15-25 we have followed the full jewel idea by equipping it with 24 Hyatt and Timken Heavy Duty Roller and Ball Bearings. These mean to the tractor what the jewels mean to the watch movement. They insure easy running, no friction, dependability, long life and power.

Combined with the LAUSON dust-proof design all gears enclosed and running in oil—and LAUSON rugged construction, the LAUSON owner has real tractor insurance for field or belt work, year after year.

Owing to our increased output we are now in a position to offer some desirable territory to dealers who can qualify for the LAUSON Sales and Service organization. If you are interested in selling the "Full Jewel" Tractor—write us for particulars.



THE JOHN LAUSON MANUFACTURING CO.

1565 Monroe Street **NEW HOLSTEIN, WIS.**

on crankshaft; belt speed 2,100 ft. per min. 2 fuel tanks, 13 and 2 gals. Bennett centrifugal air cleaner. Atwater-Kent ignition. Own make governor. Kingston 1½-in. carburetor. Cooling: Modine Spirex radiator, centrifugal pump circulation; Oakes 19-in. fan; fan belt pulleys 3x1¼ in.; flat belt. A. C. Cico spark plugs, ½ in. 4 rings to piston, 6x¼ in. Hitch: Lateral adjustment 36 in. Tractor dimensions: Length 135 in., width 82½ in., height 62 in.; shipping weight 4,000 lbs.; 242 cu. ft. packed for export. List of distributors given in specifications for Model F.

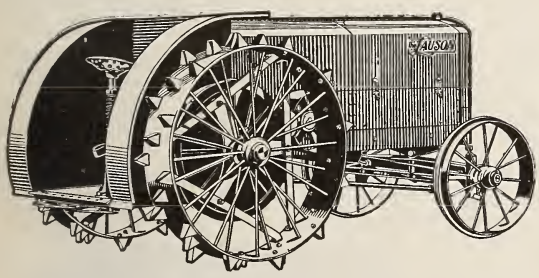
HOMER LAUGHLIN ENGINEERS CORP., LOS ANGELES, CAL.

LAUGHLIN 10-20.

A 2-plow tractor driving and steering through 2 tracks; 10 h. p. on drawbar, 20 h. p. on belt; 2,000 lbs. pull at 1¾ m. p. h.; 3 speeds forward, 1¾, 2 and 2¾ m. p. h.; diameter turning circle 9 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,750. Motor: Own, 4 cylinders vertical, valve in head, 4⅜x5½ in., developing 21 h. p. at 700 r. p. m.; recommended for distillate. Splash circulation. Bearings: Hyatt rollers in track wheels and rear axle; New Departure and SKF balls in transmission. Transmission: Enclosed gears, finished. Final drive: Enclosed spur gears, individual drive to each track. Length of tracks on ground 54 in., width 10 in. Pulley: 12x6 in., 700 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,198 ft. per min. Fuel capacity 21 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Pierce governor. Ensign 1¼-in. carburetor. Cooling: Own radiator, pump circulation; Oakes 21-in. fan, gear driven. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to pistons, 4⅜x¼ in. Hitch: Pull bar swings in 22-in. radius, vertically 14 in. Tractor dimensions: Length, including seat, 9 ft. 10 in., width 56⅛ in., height 49 in.; shipping weight 6,000 lbs.

JOHN LAUSON MFG. CO., NEW HOLSTEIN, WIS.

LAUSON FULL JEWELED.



A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; recommended for threshers up to 30 in.; 2,900 lbs. pull at plowing speed; 2 speeds forward, 1¾ and 2½ m. p. h.; diameter turning circle 20 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,985. Motor: Lauson-Beaver, valve in head, 4 cylinders vertical, 4½x6 in., 950 r. p. m.; fuel recommended, kerosene or gasoline. Lubrication: Circulating splash and pressure; oil recommended, BB Mobiloil in summer and Stanolind gas tractor oil for winter. Bearings: Front wheels, Timken roller; rear wheels, rear axle, transmission and jackshaft, Hyatt roller; cooling fan, ball. Transmission: Own make, enclosed gears, finished. Final drive: Enclosed bull pinion and gear. Height of drive wheels 54 in., width 12 in. Pulley: 18x8 in., 475 r. p. m.; controlled by independent clutch; driven through gears; belt speed 2,300 ft. per min. 2 fuel tanks, 13½ gals. Orem air cleaner. Dixie magneto with impulse starter. Own make governor. Kingston 1⅜-in. carburetor. Cooling: Perfex radiator, pump circulation; 30-in. fan. Splitdorf spark plugs. 4 rings to piston, 4½x¼ in. Hitch: Lateral adjustment 27 in.; vertical 3 in. Tractor dimensions: Length 136 in., width 74 in., height 62 in.; shipping weight 6,500 lbs.; 300 cu. ft. packed for export.

LEADER TRACTOR MFG. CO., DES MOINES, IA.

REX 12-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 20 to 24-in. threshers; 2,400 lbs. pull at plowing speed; 2 speeds forward, 2½ and 4 m. p. h.; retail price f. o. b. factory Jan. 1, 1919, $1,800. Motor: Waukesha, L head, 4 cylinders vertical, 4¼x5¾ in., 900 r. p. m.; fuel recommended, kerosene. Circulating splash lubrication; oil recommended, Mobiloil. Transmission: Own make, enclosed gears, cut and heat treated. Final drive: Open or enclosed bull pinion and gear. Height of drive wheels 60 in., width 10 in. Pulley: 12x7 in., 900 r. p. m.; controlled by motor clutch; belt speed 2,827 ft. per min. 2 compartment fuel tank, 5 and 20 gals. Ignition: Eisemann high tension magneto with impulse starter. Waukesha enclosed governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, centrifugal pump circulation; Oakes 18 in. fan; width of fan belt pulleys 2 in.; flat belt 8 ft. long, 2 in. wide. Silvex spark plugs, ⅞ in. 3 rings to piston, 4¼x¼ in. Hitch: Lateral adjustment 40 in. Tractor dimensions: Height 72 in., width 78 in.; shipping weight 5,800 lbs.

LEONARD TRACTOR CO., JACKSON, MICH.

LEONARD 4-WHEEL DRIVE 20-30

A 3 to 4-plow tractor with 4 wheels, all drivers; 20 h. p. on drawbar, 30 h. p. on belt; recommended for 28-in. thresher; 4,200 lbs. pull at plowing speed; 2 speeds forward, 2 to 4 m. p. h.; diameter turning circle 15 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,000. Motor: Beaver, valve in head, 4 cylinders vertical, 4½x6 in., 1,000 r. p. m.; fuel recommended, gasoline or kerosene. Force feed and splash lubrication. Bearings: Front and rear wheels, rear axle and cooling fan, Bower roller; transmission, SKF ball. Transmission: Own make enclosed gears, nickel steel, cut, hardened and ground. Final drive: Internal pinions and gears, enclosed and oil tight. Height of rear wheels 50 in., front wheels 30 in.; width of rear wheels 12 in.; front wheels 9 in. Pulley: 16x8 in., 575 r. p. m.; controlled through motor clutch; driven through gears; belt speed 2,400 ft. per min. 2 fuel tanks, 5 and 20 gals. Leonard water air cleaner. Dixie magneto with impulse starter. Duplex governor. Zenith 1½-in. carburetor. Cooling: Modine Spirex radiator, pump circulation; Pitter 16-in. fan; fan belt pulleys 6x2½ in.; flat belt, 4 ft. 2 in. long, 2¼ in. wide. Splitdorf spark plugs, S. A. E. 4 rings to piston, 6x⅜ in. Hitch: Lateral adjustment 24 in., vertical 10 in. Tractor dimensions: Length 126 in., width 77 in., height 70 in.; shipping weight 5,000 lbs.; 162 cu. ft. packed for export. Foreign distributors: Chipman Ltd., 8-10 Bridge St., New York, N. Y.

LITTLE GIANT CO., MANKATO, MINN.

LITTLE GIANT MODEL B.

A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 22 h. p. on belt; recommended for 24-in. thresher; 2,200 lbs. pull at plowing speed; 3 speeds forward, 1½, 3 and 6 m. p. h.; diameter turning circle 26 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,950. Motor: Own make, L head, 4 cylinders vertical, 4½x6 in., 900 r. p. m.; fuel recommended, kerosene. Lubrication: Circulating splash and pressure; oil recommended, Little Giant tractor oil. Bearings: Hyatt

roller throughout except cooling fan, which has ball bearings. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gears, open. Height of drive wheels 54 in., width 14 in. Pulley: 9x7 in., 900 r. p. m.; controlled by independent friction clutch; driven through gears. 2 fuel tanks, 5 and 25 gals. Own make dry air cleaner. Kingston magneto with impulse starter. Own make governor. Kingston 1¼-in. carburetor. Cooling: Own make radiator, pump circulation. Splitdorf spark plugs: Hitch: Lateral adjustment 36 in. Tractor dimensions: Length 144 in., width 56 in., height 59 in.; shipping weight 5,200 lbs.; 300 cu. ft. packed for export.

LITTLE GIANT CO., MANKATO, MINN.
LITTLE GIANT MODEL A.

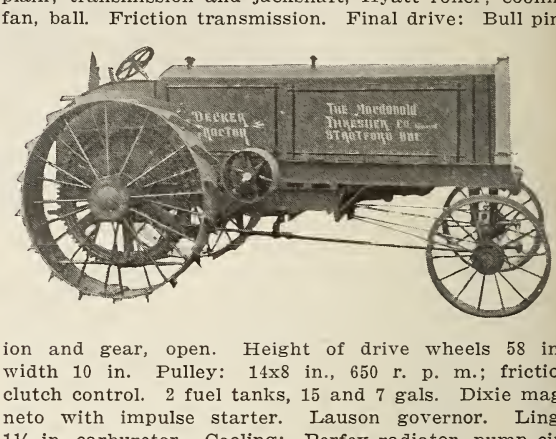
A 5 to 6-plow tractor with 2 drive wheels and 2 steering wheels; 26 h. p. on drawbar, 35 h. p. on belt; recommended for 32-in. thresher; 3,500 lbs. pull at plowing speed; 3 speeds forward, 1½, 3 and 6 m. p. h.; diameter turning circle 36 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,900. Motor: Own make, L head, 4 cylinders vertical, 5½x6 in., 750 r. p. m.; fuel recommended, kerosene. Lubrication: Circulating splash and pressure; oil recommended, Little Giant tractor oil. Bearings: Hyatt roller throughout except cooling fan, which has ball bearings. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gear, open. Height of drive wheels 66 in., width 20 in. Pulley: 13x9 in., 750 r. p. m.; controlled by independent friction clutch; driven through gears. 2 fuel tanks, 5 and 35 gals. Own make dry air cleaner. Kingston magneto with impulse starter. Own make governor. Kingston 1½-in. carburetor. Cooling: Own make radiator, pump circulation. Splitdorf spark plugs. Hitch: Lateral adjustment 48 in. Tractor dimensions: Length 168 in., width 75 in., height 73 in.; shipping weight 8,700 lbs.; 400 cu. ft. packed for export.

LOMBARD AUTO TRACTOR-TRUCK CORP., NEW YORK.
LOMBARD AUTO TRACTOR-TRUCK.

A 12-plow tractor-truck with 2 driving tracks and 2 steering wheels; 120 b. h. p.; 15,000 lbs. pull at drawbar; truck capacity 31 tons; 2 speeds forward, 4 and 6 m. p. h.; diameter turning circle, 50 ft. Motor: T head, 6 cylinders vertical, 5½x6¾ in., 1,200 r. p. m.; fuel recommended, gasoline. Internal force feed lubrication. Special bearings throughout. Constant mesh transmission, finished gears. Final drive: Worm. Length of tracklayers on ground, 10 ft.; width 12 in. Pulley: Special equipment. 2 fuel tanks, 1 and 65 gals. Ignition: Distributor with special self starter. Cooling: Radiator, pump circulation; 24 in. fan; fan belt pulleys 3¼ in.; flat belt 3 in. wide. Tractor-truck dimensions: Length 21 ft., width 6 ft. 6 in.

MACDONALD THRESHER CO., LTD., STRATFORD, ONT.
MACDONALD 12-24.

A 3-plow tractor with 2 drive wheels and 2 steering wheels: 12 h. p. on drawbar, 24 h. p. on belt; recommended for 24 to 28 in. thresher; 5 speeds forward; diameter turning circle, 7 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,650. Motor: Doman, L head, 4 cylinders vertical, 4¾x6 in., 750 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Circulating splash and internal force feed; oil recommended, Mobiloil B and BB. Bearings: Wheels and rear axles, plain; transmission and jackshaft, Hyatt roller; cooling fan, ball. Friction transmission. Final drive: Bull pin-

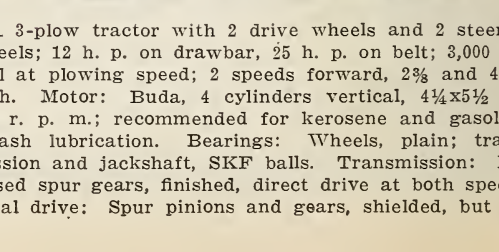


ion and gear, open. Height of drive wheels 58 in., width 10 in. Pulley: 14x8 in., 650 r. p. m.; friction clutch control. 2 fuel tanks, 15 and 7 gals. Dixie magneto with impulse starter. Lauson governor. Linga 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Cakes 22-in. fan; fan belt pulleys 3¼ and 7x1¾ in.; flat belt 3 ft. 9 in. long and 1½ in. wide. Splitdorf spark plugs, ⅞ in. S. A. E. Hitch: Lateral adjustment 23 in. Tractor dimensions: Length 10 ft. 6 in., width 6 ft., height 5 ft. 11 in.; shipping weight 6,500 lbs. Branches: Winnipeg, Man., Saskatoon, Sask., Calgary, Alta.

MARKET GARDEN TRACTOR CO., MINNEAPOLIS.
MARKET GARDEN TRACTOR.

A garden or orchard tractor driving through 2 front wheels with 2 caster supporting wheels in the rear, guided by the operator walking behind; speed variation from 1 to 2½ m. p. h.; turning radius 6 ft.; retail price Jan. 1, 1919, $295 f. o. b. factory. Motor: 1 cylinder, 2 cycle, 4x4 in. Motor lubricated by oil mixed with fuel. Worm transmission in final drive, operating in oil. Timken and ball bearings. Drive wheels 24 in. high, 4 in. wide. Equipped with pulley. Tractor dimensions: Length, including handles, 71 in., width 28½ in., height 30½ in.; distance between wheels 20 in.

MASSEY-HARRIS CO., LTD., TORONTO, ONT.
MASSEY-HARRIS 12-25.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2⅜ and 4 m. p. h. Motor: Buda, 4 cylinders vertical, 4¼x5½ in., 900 r. p. m.; recommended for kerosene and gasoline. Splash lubrication. Bearings: Wheels, plain; transmission and jackshaft, SKF balls. Transmission: Enclosed spur gears, finished, direct drive at both speeds. Final drive: Spur pinions and gears, shielded, but not

enclosed. Drive wheels 60 in. high, 10 in. wide. Pulley: 12x7 in., 900 r. p. m.; controlled by friction clutch; mounted on crankshaft; belt speed 2,826 ft. per min. Capacity fuel tanks, kerosene 18 gals., gasoline 1 gal., water 2 gals. Bennett centrifugal air cleaner. Kingston magneto with impulse starter. Pickering governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; capacity 5 gals. Tractor Dimensions: Length 12 ft., width 6 ft., height 5 ft. 6 in.; shipping weight 5,200 lbs. Branches: Montreal, Moncton, Winnipeg, Regina, Saskatoon, Swift Current, Yorkton, Calgary, Edmonton, Vancouver and Kamloops.

MAXIM CORP., NEW YORK.
MAXIM.

A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 29.6 h. p. on belt; recommended for 24-in. thresher; 2,800 lbs. pull at plowing speed; 3 speeds forward, 1, 1¾ and 2⅔ m. p. h.; diameter turning circle 21 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,685. Motor: Own make, L head, 4 cylinders vertical, 4¼x5½ in., 900 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Circulating splash and force feed; oil recommended, Mobiloil B in summer, A in winter. Bearings: Wheels, Timken roller; jackshaft, Hyatt roller. Transmission: Own make gears, enclosed and runs in oil, finished and heat treated chrome nickel steel. Final drive: Worm to jackshaft, enclosed spur gears to live axle. Height of drive wheels 40 in., width 10 in. Pulley: 8x8 in.; controlled by engaging gears; driven through gears; belt speed 2,100 ft. per min. 2 fuel tanks, 1 and 18 gals. Bennett centrifugal air cleaner. Dixie high tension magneto with impulse starter. Governor: Own make, fly ball. Holley or Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Standard 20-in. fan; fan belt pulleys, 1½ in.; flat belt with flanged pulleys, 26 in. long and 1½ in. wide. Splitdorf spark plugs, ½ in. with kerosene, ¾ in. with gasoline. 4 rings to piston, 4¼x5-16 in. Hitch: Lateral adjustment, floating; vertical, 8 in. Tractor dimensions: Length 121 in., width 64 in., height 62 in. to top of steering gear, 53 in. to top of radiator; shipping weight 4,000 lbs.; 232.967 cu. ft. packed for export.

MEDINA HOKE TRACTOR CO., MEDINA, N. Y.
MEDINA HOKE.

A 2-plow tractor with 2 driving and steering wheels; 24 h. p. on belt; recommended for 24-in. thresher; diameter turning circle 12 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,600. Motor: Waukesha, L head, 4 cylinders vertical, 4¼x5¾ in., 900 r. p. m.; fuel recommended, gasoline or kerosene Circulating splash lubrication. Bower roller bearings throughout. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gears, open. Height of wheels 61 in., width 12 in. Pulley: 10x7 in., 900 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 2,340 ft. per min. 2 fuel tanks. Bennett centrifugal air cleaner. Magneto ignition with impulse starter. Built-in governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Waukesha 20-in. fan; fan belt pulleys 2 in. wide; flat belt. Spark plugs ⅞ in. S. A. E. Tractor dimensions: Length 16 ft., width 56 in., height 66 in.; shipping weight 3,800 lbs.

MIDGET TRACTOR CO., MINNEAPOLIS.
MIDGET 8-12.

A general purpose and cultivating tractor with 2 drive wheels in front and supporting wheels in rear with a capacity for 1 14-in. bottom; 8 h. p. on drawbar, 12½ h. p. on belt; clearance 17 in. regular, 23 in. for corn cultivation; 40-in. tread; 2 speeds forward, 2½ and 5 m. p. h.; diameter turning circle 10 ft.; retail price Jan. 1, 1919, $735, f. o. b. factory. Motor: Le Roi, 4 cylinders vertical, 3⅛x4½ in., 1,000 r. p. m.; recommended for gasoline. Circulating splash lubrication. Bearings: New Departure balls in transmission; Hyatts in wheels. Transmission: Enclosed spur gears, finished. Final drive: Double worm, one driving each wheel, differential in

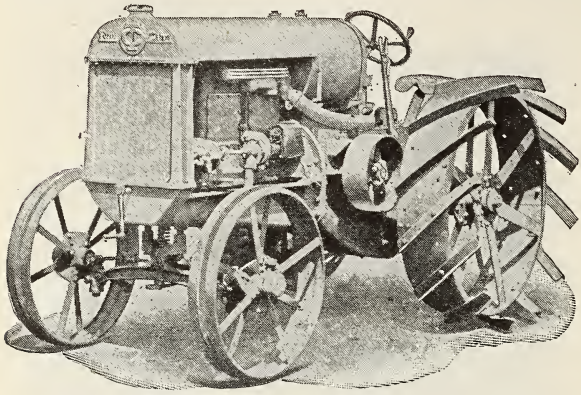
transmission. Drive wheels 36 in. high regular, 48 in. for corn cultivation; 6 in. wide. Pulley: 10x4 in., 1,000 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,600 ft. per min. Fuel capacity 5 gals. Atwater-Kent ignition. Kingston carburetor. Cooling: Truck type radiator, thermo-syphon circulation; 16-in. fan. 3 rings to pistons, width 3-16 in. Swinging hitch to front axle, operator riding either on truck or implement. Dimensions: Length 8 ft., width 4 ft., height 40 in.; shipping weight 1,500 lbs.

MIDWEST ENGINE CO., INDIANAPOLIS, IND.
ATLAS 16-26.

A 3-plow tractor with 2 drive wheels and 1 steering wheel; 12.8 h. p. on drawbar, 18.5 h. p. on belt, S. A. E. rating; recommended for 24-in. thresher; 2,800 lbs. pull at plowing speed, 2½ to 3 m. p. h.; diameter turning circle 18 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,750. Motor: Waukesha, L head, 4 cylinders vertical in pairs, 4¼x5¾ in., 1,000 r. p. m.; fuel recommended, kerosene. Circulating splash lubrication; oil recommended, Mobiloil B in summer and Mobiloil A in winter. Bearings: Front and rear wheels and rear axle, plain; transmission and jackshaft, Hyatt roller and plain; cooling fan, balls. Transmission: Own make, enclosed gears, cut steel and hardened. Final drive: Bull pinion and gear, open. Height of drive wheels 66 in., width 12 in. Pulley: 10x8 in., 875 r. p. m.; controlled by motor clutch, driven by chain; belt speed, 2,300 ft. per min. 2 compartment fuel tank, 15 and 20 gals. Air cleaner: Own, oil centrifugal. Dixie magneto with impulse starter. Waukesha governor. Kingston double bowl 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes 18-in. fan; flat belt. Spark plugs, ⅞ in. S. A. E. Hitch: Lateral adjustment 15 in. Tractor dimensions:

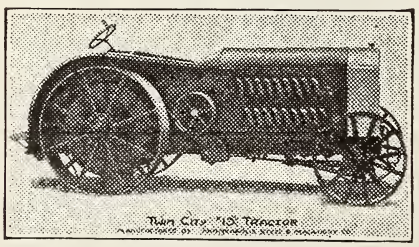
Length 125 in., width 67 in., height 69 in.; shipping weight 5,500 lbs. Chipman Ltd., 10 Bridge St., New York City, export agents.

MINNEAPOLIS STEEL & M'CH'Y CO., MINNEAPOLIS. TWIN CITY 12-20.



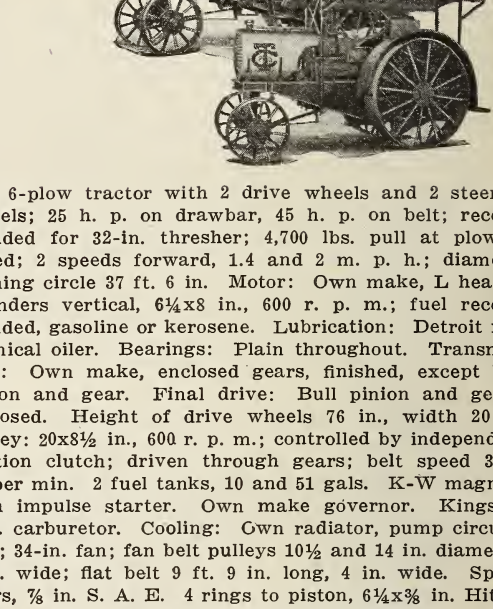
A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; recommended for 20-in. thresher; 2,000 lbs. pull at plowing speed; 2 speeds forward, 2.2 and 2.9 m. p. h.; diameter turning circle 25 ft. 4 in. Motor: Own make, valve in head, 4 cylinders vertical, 4¼x6 in., 1,000 r. p. m.; fuel recommended, gasoline or kerosene. Internal force feed lubrication. Bearings: Front wheels, plain; rear wheels, rear axle, transmission and jackshaft, Hyatt rollers; cooling fan, balls. Transmission: Own make, enclosed gears, finished. Live axle drive. Height of drive wheels 50 in., width 12 in. Pulley: 16x6 in., 650 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,715 ft. per min. 2 fuel tanks, 23 and 3 gals. Bennett or Donaldson centrifugal air cleaner. Bosch magneto with impulse starter. Pierce governor. Holley 1¼-in. carburetor. Cooling: Spirex radiator, pump circulation; Oakes 20-in. fan; fan belt pulleys 3⅜ and 5½ in. diameter, 2½ in. wide; flat belt 2 in. wide. Spark plugs, ⅞ in. S. A. E. 4 rings to piston, 4¼x¼ in. Hitch: Lateral adjustment 15 in. Tractor dimensions: Length 134 in., width 63 in., height 63½ in.; shipping weight 4,500 lbs.

MINNEAPOLIS STEEL & M'CH'Y CO., MINNEAPOLIS. TWIN CITY 16-30.



A 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 30 h. p. on belt; recommended for 24-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2 and 2¾ m. p. h.; diameter turning circle 33 ft. Motor: Own make, L head, 4 cylinders vertical, 650 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Detroit mechanical oiler. Bearings: Hyatt roller throughout, except cooling fan, with plain bearings. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and internal gears, enclosed. Height of drive wheels 54 in., width 14 in. Pulley: 17x8 in., 528 r. p. m.; controlled by motor clutch; belt speed 2,350 ft. per min. 2 fuel tanks, 3 and 33 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Own make governor. Holley 1½-in. carburetor. Cooling: Modine-Spirex radiator, pump circulation; own 24-in. fan; fan belt pulleys 3¼ and 9½ in. diameter, 3 in. wide; flat belt 4 ft. 2 in. long and 2½ in. wide. Spark plugs: ⅞ in. S. A. E. 5 rings to piston, 5x9-32 in. Hitch: Lateral adjustment 36 in. Tractor dimensions: Length 179 in., width 70 in., height 72 in.; shipping weight 8,500 lbs.

MINNEAPOLIS STEEL & M'CH'Y CO., MINNEAPOLIS. TWIN CITY 25-45.



A 6-plow tractor with 2 drive wheels and 2 steering wheels; 25 h. p. on drawbar, 45 h. p. on belt; recommended for 32-in. thresher; 4,700 lbs. pull at plowing speed; 2 speeds forward, 1.4 and 2 m. p. h.; diameter turning circle 37 ft. 6 in. Motor: Own make, L head, 4 cylinders vertical, 6¼x8 in., 600 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Detroit mechanical oiler. Bearings: Plain throughout. Transmission: Own make, enclosed gears, finished, except bull pinion and gear. Final drive: Bull pinion and gears, enclosed. Height of drive wheels 76 in., width 20 in. Pulley: 20x8½ in., 600 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 3,150 ft. per min. 2 fuel tanks, 10 and 51 gals. K-W magneto with impulse starter. Own make governor. Kingston 2-in. carburetor. Cooling: Own radiator, pump circulation; 34-in. fan; fan belt pulleys 10½ and 14 in. diameter, 5 in. wide; flat belt 9 ft. 9 in. long, 4 in. wide. Spark plugs, ⅞ in. S. A. E. 4 rings to piston, 6¼x⅜ in. Hitch: Lateral adjustment 28 in. Tractor dimensions: Length 219 in., width 81 in., height 124 in.; shipping weight 17,000 lbs.

MINNEAPOLIS STEEL & M'CH'Y CO., MINNEAPOLIS. TWIN CITY 40-65.

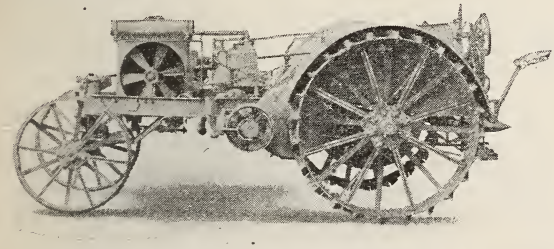
An 8-plow tractor with 2 drive wheels and 2 steering wheels; 40 h. p. on drawbar, 65 h. p. on belt; recommended for 40-in. thresher; 7,500 lbs. pull at plowing speed, 2 m. p. h.; diameter turning circle 42 ft. 6 in. Motor: Own made, L head, 4 cylinders vertical, 7¼x9 in., 500 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Detroit mechanical oiler. Plain bearings throughout. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gears, enclosed. Height of drive wheels 84 in., width 24 in. Pulley: 23x10½ in., 500 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 3,000 ft. per min. 2 fuel tanks, 10 and 95 gals. K-W magneto with

impulse starter. Own make governor. Kingston 2½-in. carburetor. Cooling: Own radiator, pump circulation; 36½-in. fan; fan belt pulleys 10½ and 17½ in. diameter, 4¾ in. wide; flat belt 10 ft. 5 in. long, 4 in. wide. Spark plugs, ½ in. 4 rings to piston, 7¼x½ in. Hitch: Lateral adjustment 36 in. Tractor dimensions: Length 240 in., width 102 in., height 122 in.; shipping weight 25,000 lbs.

MINNEAPOLIS STEEL & M'CH'Y CO., MINNEAPOLIS.
TWIN CITY 60-90.

A 12-plow tractor with 2 drive wheels and 2 steering wheels; 60 h. p. on drawbar, 90 h. p. on belt; recommended for threshers 40 in. and over; 11,250 lbs. pull at plowing speed, 2 m. p. h.; diameter turning circle 48 ft. Motor: Own make, L head, 6 cylinders vertical, 7¼x9 in., 500 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Detroit mechanical oiler. Plain bearings throughout. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gears, enclosed. Height of drive wheels 84 in., width 30 in. Pulley: 23x 10½ in., 500 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 3,000 ft. per min. 2 fuel tanks, 10 and 95 gals. K-W magneto with impulse starter. Own make governor. Kingston 3-in. carburetor. Cooling: Own radiator, pump circulation; 36½-in. fan; fan belt pulleys 10½ and 17½ in. diameter, 4¾ in. wide; flat belt 11 ft. 2 in. long, 4 in. wide. Spark plugs, ½ in. 4 rings to piston, 7¼x½ in. Hitch: Lateral adjustment 36 in. Tractor dimensions: Length 262 in., width 114 in., height 122 in.

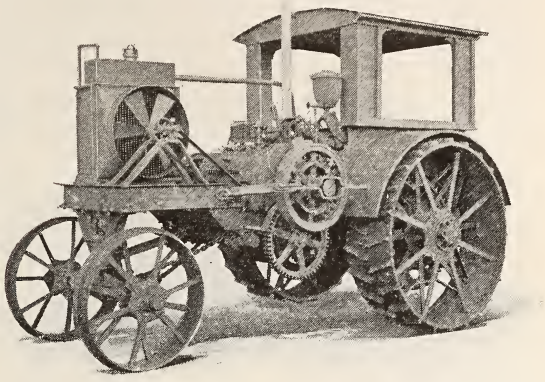
MINNEAPOLIS THRESHING MACHINE CO., HOPKINS, MINN.
MINNEAPOLIS 15.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 24-in. thresher; 2 speeds forward, 3 and 2½ m. p. h. Motor: Own make, L head, 4 cylinders vertical, 4½x7 in., 750 r. p. m.; fuel recommended, kerosene. Lubrication: Detroit mechanical oiler and splash. Plain bearings throughout. Transmission: Own make, enclosed spur gears. Final drive: Enclosed bull pinions and gears. Height of drive wheels 56 in., width 12 in. Pulley: 15x6½ in., 750 r. p. m.; controlled by motor clutch, mounted on crankshaft; belt speed 3,000 ft. per min. 2 fuel tanks, 3 and 18½ gals. K-W high tension magneto with impulse starter. Own make flyball governor, enclosed. Kingston carburetor. Cooling: Modine Spirex radiator, pump circulation; own make fan; flat 1-in. belt. Dimensions of tractor: Length 13 ft. 10 in., width 7 ft. 1½ in., height 5 ft. 10 in.; shipping weight 6,600 lbs.

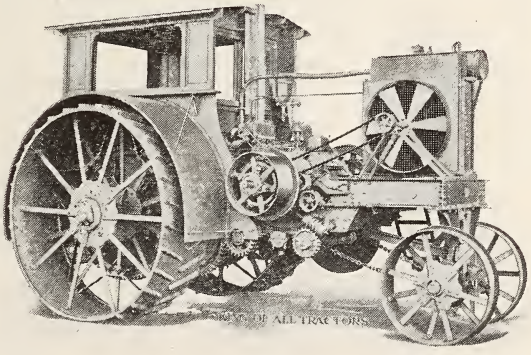
MINNEAPOLIS THRESHING MACHINE CO., HOPKINS, MINN.
MINNEAPOLIS 20.

A 4 to 5-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 28-in. thresher; 2 speeds forward, 2½ and 2 m. p. h. Motor: Own make, L head, 4 cylinders horizontal, 5¾x7 in., 700 r. p. m.; fuel recommended, kerosene. Lubrication: Detroit mechanical oiler and splash. Plain bearings throughout. Transmission: Own make, open gears, part rough, part finished. Final drive: Open bull pinions and gears. Height of drive



wheels 62 in., width 20 in. Pulley: 20x10 in., 700 r. p. m.; controlled by motor clutch, mounted on crankshaft; belt speed 3,660 ft. per min. 2 fuel tanks, 5 and 30 gals. K-W high tension magneto. Own governor. Kingston carburetor. Cooling: Own radiator, pump circulation. Shipping weight of tractor 12,000 lbs.

MINNEAPOLIS THRESHING MACHINE CO., HOPKINS, MINN.
MINNEAPOLIS 40.



A 6 to 10-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 40-in. thresher; 2 speeds forward, 2½ and 2 m. p. h. Motor: Own make, valve in head, 4 cylinders, horizontal, 7¼x9 in., 500 r. p. m.; fuel recommended, kerosene. Lubrication: Detroit mechanical oiler and splash. Plain bearings throughout. Transmission: Own, open gears, part rough, part finished. Final drive: Open bull pinion and gear. Height of drive wheels 85 in., width 30 in. Pulley: 24x10½ in., 500 r. p. m.; controlled by motor clutch, mounted on crankshaft; belt speed 3,130 ft. per min. 2 fuel tanks, 5 and 80 gals. No air cleaner. K-W high tension magneto. Own governor, enclosed. Kingston carburetor. Cooling: Own radiator, pump circulation. Tractor dimensions: Length 17 ft. 2 in., width 9 ft., height 11 ft. 4 in.; shipping weight 22,500 lbs. Branches: Aberdeen and Sioux Falls, S. D.; Billings, Mont.; Columbus, O.; Fargo and Grand Forks, N. D.; Fond du Lac, Wis.; Kansas City, Mo.; Minneapolis, Minn.; Lincoln, Neb.; Mason City, Ia.; Peoria, Ill.; Wichita, Kan.; Regina, Sask.; Winnipeg, Man.

MOLINE PLOW CO., MOLINE, ILL.
UNIVERSAL 9-18.

A 2-plow and cultivating tractor with 2 driving and steering wheels; 9 h. p. on drawbar, 18 h. p. on belt, developing 2,000 lbs. pull at 2.8 m. p. h. (1,400 motor r. p. m.) Motor: Own make, valve in head, 4 cylinders vertical, 3½x5 in.; 20 h. p. at 1,000 r. p. m.; fuel recommended, gasoline. Lubrication: Internal force feed; oil recommended, heavy for summer and medium for winter. Bearings: Wheels, Hyatt commercial; transmission and jackshaft, Hyatt high duty. Transmission: Own make, enclosed gear, finished. Final drive: Bull pinion and gear, enclosed. Height of wheels 52 in., width 8 in. Pulley: 9x6½ in., operating ¾ motor speed; gear driven; belt speed 1,760 ft. per min. at 1,000 r. p. m. of motor, 2,467 ft. per min. at 1,400 r. p. m. 1 fuel tank, 15 gals. Bennett centrifugal air cleaner. Ignition: Remy distributor. Remy governor generator. Holley 1¼-in. carburetor. Cooling: Modine radiator, thermo-syphon circulation; Oakes 17-in. fan; fan belt pulleys, 2¼x6½ and 2¼x3½ in.; flat belt, 55 11-16 in. long and 2¼ in. wide. Champion spark plugs, ½ in., pipe thread. 3 rings to piston, 3½x3-16 in. Hitch: Lateral adjustment 2 in., vertical 9 in. Tractor dimensions: Length 12 ft. 5¾ in., width 4 ft. 11⅜ in., height 5 ft. 11⅛ in.; shipping weight 3,280 lbs.; 154 11-12 cu. ft. packed for export.

MONARCH TRACTOR CO., WATERTOWN, WIS.
LIGHTFOOT 10-6.

A 1 or 2-plow tractor driving and steering through 2 tracks; 6 h. p. on drawbar, 10 h. p. on belt; 1,100 lbs. pull at plowing speed, 2 to 2½ m. p. h.; diameter turning circle 3 ft. 6 in. Retail price f. o. b. factory Jan. 1, 1919: Semi-steel tracks, $1,150; manganese tracks, $1,200. Motor: Kermath L head, 4 cylinders vertical, 4x4 in., 900 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed; oil recommended, Mobiloil B. Bearings: Transmission, plain; cooling fan, ball or Hyatt rollers. Transmission: Own make enclosed gear. Final drive: Open chain. Length of tracks on ground 38 in., width 6 or 8 in. Pulley: 9x7 in.; driven through gears. 2 fuel tanks, 1 and 9 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Own governor. Kingston 1-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes or Hy-Duty 15-in. fan; fan belt pulleys, 3 in. diameter and 1¾ in. wide inside flange; flat belt, 1½ in. wide. Spark plugs, ½ in. 4 rings to piston, 4x¼ in. Hitch: Swinging drawbar. Tractor dimentions: Length 8 ft. 2 in., width 3 ft. 6½ in., height 4 ft. 5 in.; shipping weight 3,500 lbs. gross or 3,200 lbs. net; 154 cu. ft. packed for export.

MONARCH TRACTOR CO., WATERTOWN, WIS.
NEVERSLIP 20-12.

A 3-plow tractor driving and steering through 2 tracks; 12 h. p. on drawbar, 20 h. p. on belt; recommended for 28-in. thresher; 2,200 lbs. pull at plowing speed; 2 speeds forward, 1¾ and 2¼ m. p. h.; diameter turning circle, 5 ft. 6 in.; retail price f. o. b. factory Jan. 1, 1919: Carbon steel tracks, $1,950; manganese tracks, $2,050. Motor: Erd, valve in head, 4 cylinders vertical, 4x6 in., 850 r. p. m.; fuel recommended, kerosene. Lubrication: Circulating splash; oil recommended, Mobiloil B. Bearings: Transmission, Hyatt roller; cooling fan, ball or Hyatt roller. Transmission: Foote enclosed gears, finished. Final drive: Open chain. Length of tracks on ground, 50 in.; width 12 in. Pulley: 18x8 in., 500 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,350 ft. per min. 2 fuel tanks, 2 and 23 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Erd governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes or Hy-Duty 18-in. fan; fan belt pulleys 3¼ in. diameter and 2¼ in. wide inside flange; flat belt 45 in. long and 2 in. wide. Spark plugs, ⅞ in. 3 rings to piston, 4x¼ in. Hitch: Swinging drawbar from center. Tractor dimensions: Length 9 ft. 6 in., width 5 ft. 6 in., height 6 ft.; shipping weight 6,200 lbs. net. Packed for export: Crate No. 1, 3,950 lbs., 222 cu. ft.; No. 2, 3,580 lbs., 98 cu. ft.

MONARCH TRACTOR CO., WATERTOWN, WIS.
NEVERSLIP 30-18.

A 4-plow tractor driving and steering through 2 tracks; 18 h. p. on drawbar, 30 h. p. on belt; recommended for 32-in. thresher; 3,300 lbs. pull at plowing speed; 2 speeds forward, 1¾ and 2¼ m. p. h.; diameter turning circle 5 ft. 6 in.; retail price f. o. b. factory Jan. 1, 1919: Carbon steel tracks, $2,200; manganese tracks, $2,350. Motor: Beaver, valve in head, 4 cylinders vertical, 4¾x6 in., 800 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed and splash; oil recommended, Mobiloil B. Bearings: Rear axle, plain; transmission, Hyatt roller; cooling fan, ball or Hyatt roller. Transmission: Foote enclosed gears, finished. Final drive: Open chain. Length of tracks on ground 66 in., width 12 in. Pulley: 18x8 in., 475 r. p. m.; controlled by motor clutch, driven through gears; belt speed 2,230 ft. per min. 2 fuel tanks, 2 and 23 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Beaver governor. Kingston 1⅜-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes or Hy-Duty 22-in. fan; fan belt pulleys, 3¼ in. diameter and 2¼ in. wide inside flange; flat belt 45 in. long and 2 in. wide. Spark plugs, ⅞ in. 4 rings to piston, 4¾x¼ in. Swinging drawbar hitch. Tractor dimensions: Length 10 ft. 6 in., width 5 ft. 6 in., height 6 ft. 3 in.; shipping weight 8,150 lbs. gross, or 7,400 lbs. net. Packed for export: Crate No. 1, 3,550 lbs., 248 cu. ft.; No. 2, 4,600 lbs., 113 cu. ft.

MUNCIE WHEEL CO., MUNCIE IND.
MUNCIE SQUARE TURN 15-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 25 h. p. on belt; recommended for 24-in. thresher; 3 speeds forward, 1⅝, 2½ and 3½ m. p. h.; diameter turning circle 16 ft. Motor: Beaver, valve in head, 4 cylinders vertical, 4½x6 in., 900 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Circulating splash and pressure. Bearings: Front and rear wheels and rear axle, plain; transmission, Timken roller; jackshaft, Hyatt roller. Transmission: Enclosed gears, finished. Final drive: Spur gears and roller pinions, open. Height of drive wheels 54 in., width 12 in. Pulley: 12x7 in., 900 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,800 ft. per min. 2 fuel tanks, 4 and 16 gals. Bennett centrifugal air cleaner. Eisemann magneto with impulse starter. Lauson fly ball governor. Kingston 1½-in. double bowl carburetor. Cooling: Perfex radiator, pump circulation.

Spark plugs, ⅞ in. S. A. E. Hitch: Vertical adjustment 6 in. Tractor dimensions: Length 137 in., width 70 in., height 64 in.; wheel base 78 in.; shipping weight 5,000 lbs.

NATIONAL TRACTOR CO., NEW YORK, N. Y.
NATIONAL 9-16 MODEL E.

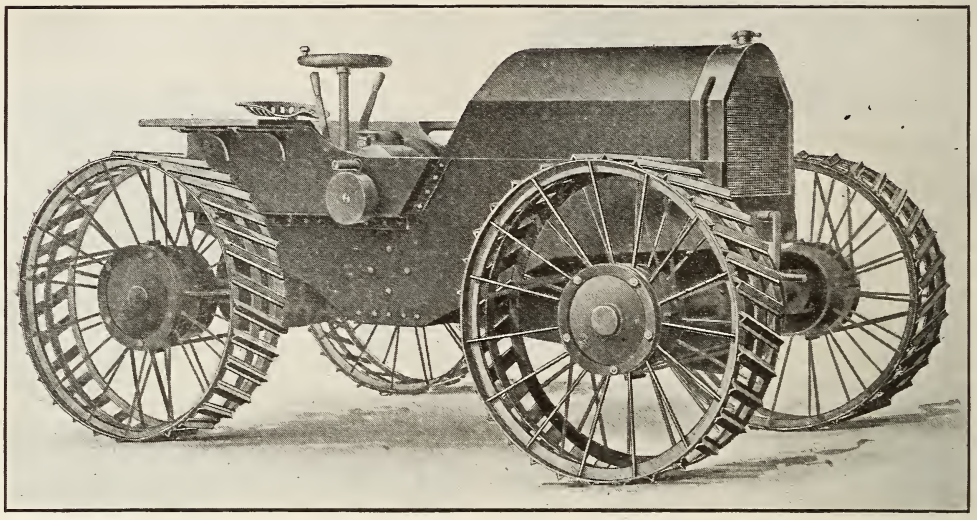
A 2-plow tractor with 2 drive wheels and 2 steering wheels; 9 h. p. on drawbar, 16 h. p. on belt; 1,800 lbs. pull at plowing speed; operating weight 3,800 lbs.; turning radius 13 ft.; retail price $1,075 f. o. b. factory. Motor: Waukesha, L head, 4 cylinders vertical, 3½x5¼ in.; 1,200 r. p. m.; recommended fuel, kerosene, gasoline or distillate; recommended oil, Havoline heavy. Lubrication: Circulating splash. Bearings: Transmission, SKF double row balls; remainder plain. Transmission: Enclosed friction, 6 speeds forward and reverse. Final drive: Spur gears to live rear axle. Drive wheels: 46 in. high, 10 in. wide. Pulley: 10x6 in., speeds 600 to 1,000 r. p. m.; driven through friction transmission; belt speed up to 2,600 ft. per minute. 2 compartment fuel tanks, kerosene 20 gals., gasoline 10 gals. Air cleaner: Bennett, centrifugal. Ignition: Dixie high tension magneto. Waukesha governor. Carburetor: Kingston, single bowl, 1 in. inlet; stove on exhaust pipe. Cooling: Water, Perfex radiator, pump circulation. Spark plugs: ⅞ in., 18 threads. Hitch: 13 in. high, lateral adjustment 23 in., vertical 7 in. Frame spring mounted in front, solid in rear. Dimensions: Length over all 123 in., width 66 in., height 59 in.; wheel base 85 in.; shipping weight 3,800 lbs.; 210 cu. ft. packed for export.

NATIONAL TRACTOR CO., NEW YORK, N. Y.
NATIONAL 14-27 MODEL F.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 14 h. p. on drawbar, 27 h. p. on belt; 2,700 lbs. pull plowing speed; recommended for 22 to 26-in. thresher; operating weight 4,200 lbs.; turning radius 13 ft.; retail price $1,375 r. o. b. factory. Motor: Waukesha, L head, 4 cylinders vertical, 4½x5¾ in., 1,200 r. p. m.; recommended fuel, kerosene or distillate; recommended oil, Havoline heavy. Lubrication: Circulating splash.

THE NELSON TRACTOR

Four-Wheel Drive



An Unusual Opportunity

FOR DEALERS AND DISTRIBUTORS

Nelson Features

Three Models

3-Plow, 15 Drawbar HP., 24 Belt HP.

5-Plow, 20 Drawbar H.P., 28 Belt HP.

8-Plow, 35 Drawbar HP., 50 Belt HP.

Four-wheel drive—positive traction.

Nelson patent drive chain—adjustable links, 70,000 lbs. tensile strength.

Nelson patent clutch and transmission.

Four-wheel steer—20-in. wheel tilt.

Open-faced wheels—no soil packing.

Wisconsin engine—four cylinders, 4¾x5½ in.

Gear-driven fan—double-core radiator.

Axles—full floating, with heavy-duty Hyatt roller bearings.

Minimum clearance—14 in., axle clearance, 19 in.

One-man operation—can be controlled from implement.

Efficiency at drawbar—75%; 82.6% shown in official test.

Costly replacements and repairs soon eat up the dealer's profit on a tractor sale.

Both may be expected with the ordinary tractor.

To eliminate these troubles, engineers have worked for years, perfecting a tractor that would give efficient service anywhere, any time.

They have succeeded.

The result is an entirely new type of tractor—the NELSON—powerful, economical to run, built for universal service, trouble-proof and will last a lifetime.

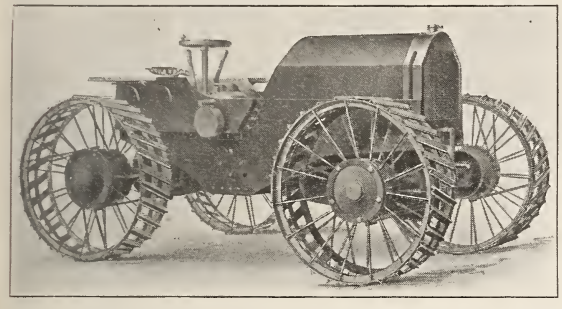
If you are in a position to handle the Nelson in your territory, act quickly. It means money.

Nelson Blower & Furnace Co.

Boston, Massachusetts

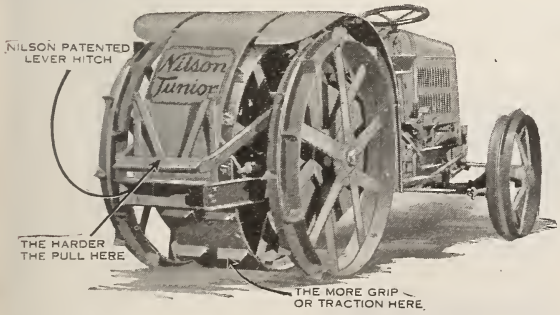
Bearings: SKF double row balls in transmission; balance plain. Transmission: Enclosed friction, 6 speeds forward and reverse. Final drive: Spur gear to live rear axle. Drive wheels: 46 in. high, 10 in. wide. Pulley: 10x6 in., speed 600 to 1,000 r. p. m.; driven through friction transmission; belt speeds, variable up to 2,600 ft. per minute. 2 compartment fuel tank, kerosene 30 gals., gasoline 10 gals. Air cleaner: Bennett, Centrifugal type. Ignition: Eisemann high tension magneto with impulse starter. Waukesha governor. Carburetor: Kingston, single bowl, 1¼ in. inlet; stove on exhaust line. Cooling: Water, Perfex radiator, pump circulation. Spark plugs: ⅞ in., 18 threads. Hitch: 13 in. high, lateral adjustment 30 in., vertical 7 in. Frame spring mounted in front, solid in rear. Dimensions: Length over all 123 in., width 71 in., height 60 in.; wheel base 85 in.; shipping weight 4,200 lbs.; 210 cu. ft. packed for export.

NELSON BLOWER & FURNACE CO., BOSTON, MASS. NELSON.



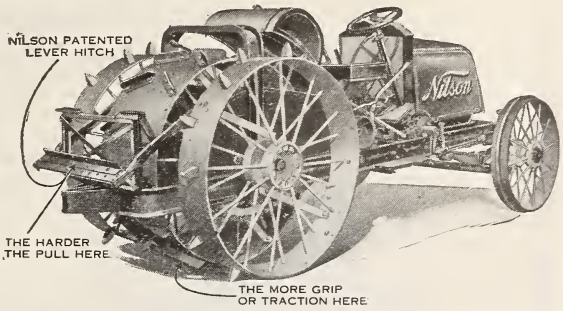
A 4-plow 4-wheel drive tractor; 20 h. p. on drawbar, 28 h. p. on belt; 5,000 lbs. pull at 1⅝ m. p. h.; 3 speeds forward, 2.2, 3 and 4½ m. p. h. Motor: Wisconsin, T head, 4 cylinders vertical, 4¾x5½ in., 900 r. p. m.; recommended for gasoline; kerosene burning devices optional. Internal force feed lubrication. Bearings: Hyatt rollers in wheels, rear axle and jackshaft; plain in transmission; balls in fan. Transmission: Own enclosed gears, finished. Drive wheels 50 in. high. Pulley: 26x7 in., 300 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,000 ft. per min. Fuel capacity 27 gals., vacuum feed. Equipped with air cleaner. K-W magneto with impulse starter. Kingston carburetor. Cooling: Own radiator, pump circulation; 23-in. gear-driven fan. Tractor dimensions: Length 12 ft., width 6 ft. 2 in., height 6 ft.

NILSON TRACTOR CO., MINNEAPOLIS, MINN. NILSON JUNIOR 16-25.



A 3 to 4-plow tractor with 3 drive wheels and 2 steering wheels; 12.8 h. p. on drawbar, 24 h. p. on belt, S. A. E. rating; recommended for 24-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2½ and 5 m. p. h.; diameter turning circle 32 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,775. Motor: Waukesha, L head, 4 cylinders vertical, 4¼x5¾ in., 900 r. p. m.; fuel recommended, gasoline and kerosene. Lubrication: Circulating splash; oil recommended, Mobiloil BB in summer, Mobiloil A in winter. Hyatt roller bearings throughout. Transmission: Enclosed gears, finished. Final drive: Enclosed chain. Height of drive wheels 50 in.; width of center wheel 16 in., 2 outer wheels 7 in. Pulley: 20x6 in., 360 r p. m.; controlled by motor clutch; driven through gears, belt speed 1,900 ft. per min. 2 fuel tanks, 2 and 21 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Waukesha governor. Kingston 1⅛-in. carburetor. Cooling: Modine radiator, pump circulation; Oakes 20-in. fan; fan belt pulleys 2x5½ and 2x3 in.; flat belt 33 in. long and 1½ in. wide. Spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4¼x¼ in. Hitch: Lateral adjustment 18 in., vertical 6 in. Tractor dimensions: Length 11 ft. 7 in., width 6 ft. 8 in., height 5 ft. 10 in.; shipping weight 5,000 lbs.; 230 cu. ft. packed for export.

NILSON TRACTOR CO., MINNEAPOLIS, MINN. NILSON SENIOR 24-36.

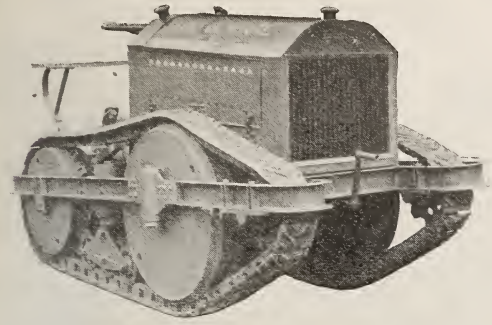


A 4-5-plow tractor with 3 drive wheels and 2 steering wheels; 19.2 h. p. on drawbar, 32 h. p. on belt, S. A. E. rating; recommended for 28 to 30-in. thresher; 4,000 lbs. pull at plowing speed; 2 speeds forward, 2¼ and 4½ m. p. h.; diameter turning circle 34 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,475. Motor: Waukesha, L head, 4 cylinders vertical, 4¾x6¾ in., 800 r. p. m.; fuel recommended, gasoline and kerosene. Lubrication: Circulating splash; oil recommended, Mobiloil BB in summer and Mobiloil A in winter. Bearings: Front wheels, bronze; rear axle, transmission and jackshaft, Hyatt roller. Transmission: Enclosed gears, finished. Final drive: Enclosed chain. Height of drive wheels 52 in.; width of center drive wheel 20 in.; width of outer drive wheels 10 in. Pulley: 24x8 in., 320 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,010 ft. per min. 2 fuel tanks, 3 and 28 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Waukesha governor. Kingston 1¼-in. carburetor. Cooling: Modine radiator, pump circulation; Oakes 22-in. fan; fan belt pulleys 2x8¼ and 2x3 in.; flat belt 41 in. long and 1¾ in. wide. Spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4¾x¼ in. Hitch: Lateral adjustment 24 in., vertical 6 in. Tractor dimensions: Length 13 ft. 9 in., width 7 ft. 5 in., height 5 ft. 9 in.; shipping weight 6,400 lbs.; 270 cu. ft. packed for export.

OHIO GENERAL TRACTOR CO., CLEVELAND, O. OHIO GENERAL.

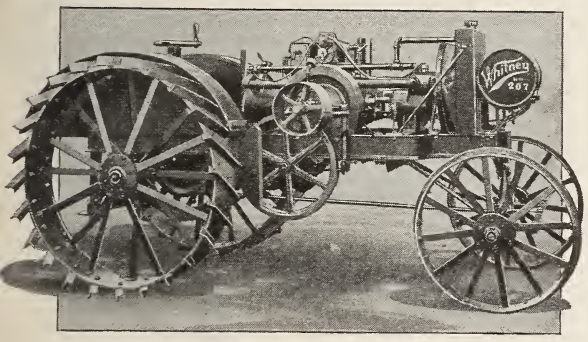
A 3-to 4-plow tractor driving and steering through 2 tracks; 25 h. p. on drawbar, 30 h. p. on belt; recommended for 28-in. thresher; 3,000 to 3,500 lbs. pull at plowing speed; 2 speeds forward, 2.2 and 3.1 m. p. h.; diameter turning circle 8 ft.; retail price f. o. b. factory

Jan. 1, 1919, $1,800. Motor: Buda H. T. U., L head, 4 cylinders vertical, 4¼x5½ in., 1,000 r. p. m.; fuel recommended, gasoline or kerosene. Internal force feed lubrication. SKF bearings throughout. Transmission: Enclosed gears, finished. Length of tracks on ground 48 in., width 8 in. Pulley: 8x6 in., 850 r. p. m.; controlled by independent friction clutch; driven through gears;



belt speed 1,785 ft. per min. 2 fuel tanks, 8 gals. each. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Pierce governor. Bennett carburetor. Cooling: Own radiator, pump circulation; Buda 18-in. fan; width of fan belt pulleys 2 in.; flat belt 2 in. wide. Splitdorf spark plugs. Hitch: Vertical adjustment 24 in. Tractor dimensions: Length 90 in., width 50 in., height 48 in.; shipping weight 3,500 lbs.

OHIO MFG. CO., UPPER SANDUSKY, O.
WHITNEY 9-18.



A 2-plow tractor with 2 drive wheels and 2 steering wheels; 9 h. p. on drawbar, 21 h. p. on belt; 1,600 lbs. pull at plowing speed; 3 speeds forward, 1¾, 2½ and 4 m. p. h.; diameter turning circle 11 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,175. Motor: Gile, L head, 2 cylinders opposed, 5½x6½ in., 750 r. p. m.; fuel recommended, gasoline. Lubrication: Madison-Kipp force feed oiler and splash; oil recommended, Mobiloil BB in summer, Mobiloil A in winter. Bearings: Front wheels, plain; rear axle, roller; transmission, Timken; cooling fan, Hyatt. Transmission: Enclosed gears, finished. Final drive: Open chain. Height of drive wheels 48 in., width 10 in. Pulley: 11x6¾ in., 750 r. p. m.; controlled by motor clutch, mounted on crankshaft; belt speed 2,160 ft. per min. 1 fuel tank, 9 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Gile governor. Bennett 1½-in. carburetor. Cooling: Modine radiator, pump circulation; Hy-Duty 18-in. fan; fan belt pulleys 8x1 in. and 3½x1 in.; flat belt 7 ft. 9 in. long and 1 in. wide. Spark plugs: ½ in. regular. 3 rings to piston, ¼x5½ in. Hitch: Lateral adjustment 22 in., vertical 13 in. Tractor dimensions: Length 123 in., width 56 in., height 58½ in.; shipping weight 3,000 lbs. Distributors: Whitney Tractor Sales Co., 349 The Arcade, Cleveland, O.; Pacific Whitney Tractor Co., Los Angeles, Cal.

OLDSMAR TRACTOR CO., OLDSMAR, FLA.
OLDSMAR.

A 1-plow (10 in.) tractor with 2 drive wheels and 2 steering wheels; 2 h. p. on drawbar, 5 h. p. on belt; 1 speed forward, 2½ m. p. h.; 9 ft. turning circle; retail price Jan. 1, 1919, $300 f. o. b. factory. Motor: Own, 1 cylinder horizontal, valve in head, 5x5 in., 550 r. p. m.; recommended for gasoline. Lubrication: Gravity oiler and splash. Plain bearings throughout. Transmission: Enclosed and finished gears, and belt. Final drive: Direct to live axle. Drive wheels 32 in. high, 8 in. wide. Pulley: 5x3¾ in., 550 r. p. m.; mounted on crankshaft; belt speed 700 ft. per min. Fuel capacity 2 gals. Battery and coil ignition. Hit-and-miss governor. Motor air cooled. Champion spark plug, ½ in. pipe thread. 3 rings to piston, 5x⅜ in. Tractor dimensions: Length 96 in., width 34 in., height 36 in.; shipping weight 900 lbs.

OLIVER TRACTOR CO., KNOXVILLE, TENN.
OLIVER 12-20 MODEL B.

A 2 to 3-plow tractor with 2 driving tracks and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; recommended for 24-in. thresher; 3 speeds forward, 1¾, 2⅓ and 3½ m. p. h.; diameter turning circle 22 ft. Motor: Buda, L head, 4 cylinders vertical, 4¼x5½ in., 900 r. p. m.; fuel recommended, gasoline, but can equip for kerosene. Lubrication: Internal force feed to all bearings; oil recommended, Mobiloil B in summer, Mobiloil A in winter. Bearings: Front wheels, bronze bushed; rear sprocket and all track wheels, Hyatt commercial; transmission, Hyatt high duty; cooling fan, balls. Transmission: Own make, enclosed gears, finished and hardened. Final drive: Bull pinion and gear, enclosed. Length of tracks on ground 36 in.; width 11 in. Pulley: 15x6½ in., 633 r. p. m.; controlled by motor clutch; belt speed, 2,485 ft. per min. 2 fuel tanks, 5 and 15 gals. Bennett centrifugal air cleaner. Dixie high tension magneto with impulse starter. Pierce governor. Kingston carburetor for gas and Bennett for kerosene, 1¼ in. Cooling: Modine Spirex radiator, centrifugal pump circulation; Oakes 20-in. fan; belt pulleys, 5½ and 2½x2 in.; flat belt. Rajah spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4¼x5-16 in. Hitch: Lateral adjustment 12 in., vertical 8 in. Tractor dimensions: Length 12 ft., width 51 in., height to top of steering wheel 59 in.; shipping weight 5,500 lbs.; packed for export, 6,500 lbs., 250 cu. ft.

OLIVER TRACTOR CO., KNOXVILLE, TENN.
OLIVER 15-30 MODEL A.

A 3 to 4-plow tractor with 2 driving tracks; 15 h. p. on drawbar, 30 h. p. on belt; recommended for 28-in. thresher; 2 speeds forward, 2⅓ and 1¾ m. p. h.; diameter turning circle 11 ft. Motor: Chief, valve in head, 4 cylinders vertical, 4½x6 in., 900 r. p. m.; fuel recommended, gasoline, but can equip for kerosene. Lubrication: Internal force feed; oil recommended, Mobiloil B in summer and Mobiloil A in winter. Bearings: Tracks, Hyatt commercial type; rear axle and transmission, Hyatt high duty; cooling fan, balls. Transmission: Own make, enclosed gears, finished and hardened. Live axle drive. Length of tracks on ground 60 in., width 11 in. Pulley: 18x6½ in., 450 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,120 ft. per min. 2 fuel tanks, 5 and 15 gals. Bennett centrifugal air cleaner. Dixie high tension magneto with impulse starter. Governor: Centrifugal built into motor. Kings-

"See How Simply It's Built"

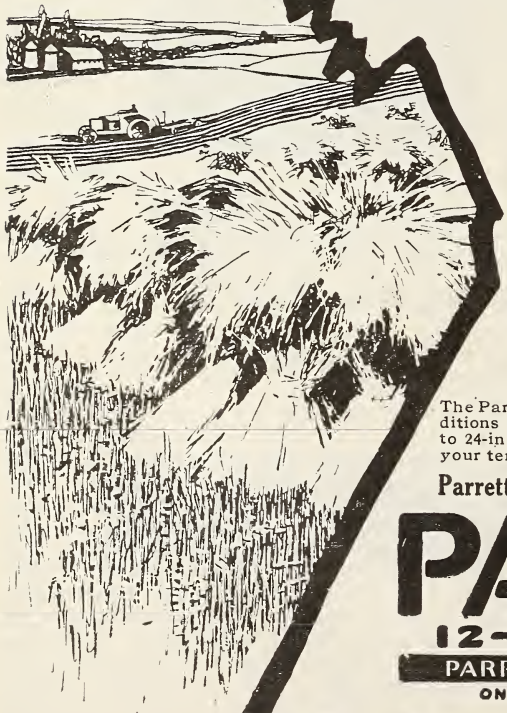
Dealers are proud to show the simple, dependable, economical construction of the Parrett tractor—a tractor short on extra service-demands and long on profits. The power of its strong, sturdy motor is delivered by direct drive to the belt pulley and with simple spur gears to the wheels whether the tractor is running on high or low gear.

This elimination of power-consuming parts spells "ECONOMY" in big letters. The maximum power of the engine is delivered to draw-bar or belt with the minimum consumption of fuel.

Furthermore, this simple gearing in the Parrett Tractor is made of heat-treated, hardened, cut steel with shafts mounted on high-grade, anti-friction bearings. This still further reduces the friction loss of power.

But the cost is even further reduced by the use of a sensitive governor which makes it impossible to use more than enough fuel to accomplish the work in hand.

No wonder that for six years the Parrett has proved such a decided success with farm owners in all parts of the country.



The Parrett 12-25 tractor pulls three plows under ordinary conditions and will accomplish belt work equal to running a 20-in. to 24-in. separator. There may be a Parrett agency open in your territory. Write or wire today.

Parrett Tractor Co., 473 Fisher Bldg., Chicago, Ill.

PARRETT

12–25 TRACTOR

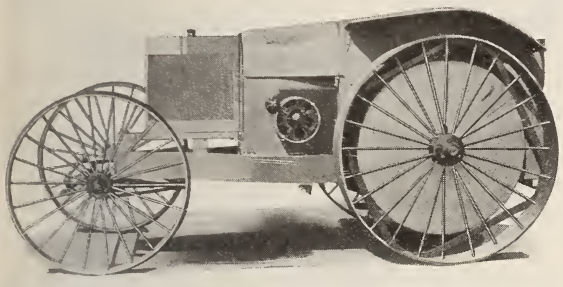
PARRETT QUALITY SPEAKS FOR ITSELF

ONE MAN ALL PURPOSE

ton carburetor for gas, Bennett for kerosene, 1½ in. Cooling: Modine Spirex radiator, pump circulation; Oakes 20-in. fan; belt pulleys, 6 in and 3 in. diameter, 1½ in. wide; flat belt. Rajah spark plugs, ⅞ in. S. A. E. 3 rings to piston, 5-16x4½ in. Hitch: Lateral and vertical adjustment, 10 in. Tractor dimensions: Length 11 ft. 5 in., width 51 in., height 53 in.; shipping weight 6,500 lbs.; packed for export 7,500 lbs., 250 cu. ft.

PARRETT TRACTOR CO., CHICAGO.

PARRETT 12-25.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; recommended for 28-in. thresher; 2,800 lbs. pull at plowing speed; 3 speeds forward, 1¾, 2⅜ and 4 m. p. h.; diameter turning circle 9 ft. 8 in. inside. Motor: Buda H. T. U. special, L head, 4 cylinders vertical, 4¼x5½ in., 1,000 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed through hollow crankshaft. Bearings: Front and rear wheels and cooling fan, Hyatt roller; transmission and jackshaft, SKF ball. Transmission: Own make, enclosed spur gears, finished. Final drive: Bull pinions and gears, enclosed. Height of drive wheels 60 in., width 10 in. Pulley: 12x8 in., 1,000 r. p. m.; controlled by motor clutch; mounted on crankshaft extension; belt speed 3,140 ft. per min. 2 fuel tanks, 3 and 18 gals. Air cleaner: Own make, water type. Ignition: Eisemann magneto with impulse starter. Own make governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes 20-in. fan; flat belt. Champion spark plugs, ⅞ in. S. A. E. 3 rings to piston, ¼-in. groove. Tractor dimensions: Length 158 in., width 77½ in., height 67½ in.; shipping weight 5,225 lbs.

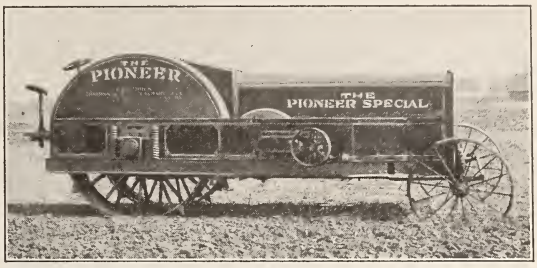
PEORIA TRACTOR CORP., PEORIA, ILL.

PEORIA 12-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; recommendded for 26-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2.4 and 4 m. p. h.; diameter turning circle 25 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,985. Motor: Climax model K. W., L head, 4 cylinders vertical, 5x6½ in., 650 to 800 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed; oil recommended, heavy in summer and medium in winter. Bearings: Front and rear wheels, plain; transmission and jackshaft, Hyatt roller; cooling fan, ball. Transmission: Nuttall, enclosed gears, finished. Final drive: Bull pinion and gear. Height of drive wheels 56 in., width 12 in. Pulley: 14x7 in., 650 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,450 ft. per min. 2 fuel tanks, 6 and 22 gals. Bennett centrifugal air cleaner. Eisemann high tension magneto with impulse starter. Climax governor. Stromberg 1½-in. carburetor. Cooling: Eureka radiator, pump circulation; Oakes 20-in. fan; fan belt pulleys 4x2 in.; flat belt 30 in. long and 2 in. wide. Spark plugs, ⅞ in. S. A. E. 3 rings to piston, ¼x5 in. Lateral hitch adjustment 22 in. Tractor dimensions: Length 12 ft. 8 in., width 64 in., height 63 in.; shipping weight 5,200 lbs.; 275 cu. ft. packed for export.

PIONEER TRACTOR MFG. CO., WINONA, MINN.

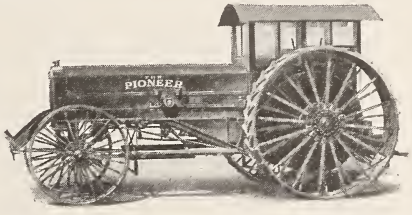
PIONEER SPECIAL 15-30.



A 4-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; recommended for 26-in. thresher; 3,800 lbs. pull at plowing speed; 3 speeds forward, 1¾, 2½ and 4 m. p. h.; diameter turning circle 30 ft. Motor: Own make, L head, 4 cylinders horizontal opposed, 5½x6 in., 750 r. p. m.; fuel recommended, kerosene. Lubrication: Detroit mechanical oiler for cylinders, internal force feed for connecting rods and journals; oil recommended, Mobiloil B in summer, Mobiloil A in winter. Plain bearings throughout. Transmission: Own make, enclosed gears, machine cut. Final drive: Enclosed chain. Height of drive wheels 60 in., width 18 in. Pulley: 14x7 in., 750 r. p. m.; controlled by motor clutch; direct driven; belt speed 2,745 ft. per min.; 3 fuel tanks, 32, 2 and 7 gals. Bennett centrifugal air cleaner. K-W magneto with impulse starter. Own make governor. Kingston 1½-in. carburetor. Cooling: S-J radiator, centrifugal pump circulation; own 22-in. fan; fan belt pulleys 10½ and 8 in. diameter, 2½ in. wide; flat belt 2¼ in. wide. Spark plugs, ½ in. standard. 3 rings to piston, width 7-16 in. Lateral hitch adjustment 12 in. Tractior dimensions: Length 191 in., width 72 in., height 66 in.; shipping weight 8,500 lbs.

PIONEER TRACTOR MFG. CO., WINONA, MINN.

PIONEER 30.



A 10-plow tractor with 2 drive wheels and 2 steering wheels; 30 h. p. on drawbar, 60 h. p. on belt; recommended for 40-in. thresher; 9,000 lbs. pull at plowing speed; 3 speeds forward, 1¾, 2¼ and 4 m. p. h.; diameter turning circle 36 ft. Motor: Own make, L head, 4 cylinders horizontal opposed, 7x8 in., 625 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Detroit mechanical oiler for cylinders, internal force feed to journals and connecting rods; oil recommended, Mobiloil B in summer and Mobiloil A in winter. Plain bearings throughout. Transmission: Own make, enclosed gears, machine cut. Final drive: Live axle, enclosed bull pinions and gears. Height of drive wheels 96 in., width 24 in. Pulley: 18x15 in., 625 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 2,940 ft. per min. 2 fuel tanks, 90 and 10 gals.

Bennett centrifugal air cleaner. K-W magneto with impulse starter. Own governor. Kingston 2-in. carburetor. Cooling: S-J radiator, centrifugal pump circulation; own 30-in. fan; fan belt pulleys 9 in. and 6 in. diameter, 6-in. face; flat belt 5 in. wide. ½-in. standard spark plugs. 4 rings to piston, ½ in. wide. Hitch: Lateral adjustment 10 ft. Tractor dimensions: Length 237 in., width 120 in., height 132 in.; shipping weight 23,000 lbs.

POPE MFG. CO., WATERTOWN, S. D.
DAKOTA.

A tractor with 17 h. p. on drawbar, 27 h. p. on belt; 1 speed change forward, 2¾ m. p. h.; retail price Jan. 1, 1919, $1,750 f. o. b. factory. Motor: 4 cylinders vertical, 4¾x6 in., 750 r. p. m.; recommended for kerosene. Splash lubrication. Transmission: Enclosed spur gears running in oil. Final drive: Link-Belt roller chain. One open face drive wheel 5 ft. wide, 42 in. diameter. Pulley: 14x7 in., operating motor speed; mounted on crankshaft; belt speed 2,745 ft. per min. Equipped with air cleaner. K-W magneto with impulse starter. Linga 1½-in. carburetor. Weight complete 5,200 lbs.

PORTER TRACTOR CO., DES MOINES, IA.
PORTER.

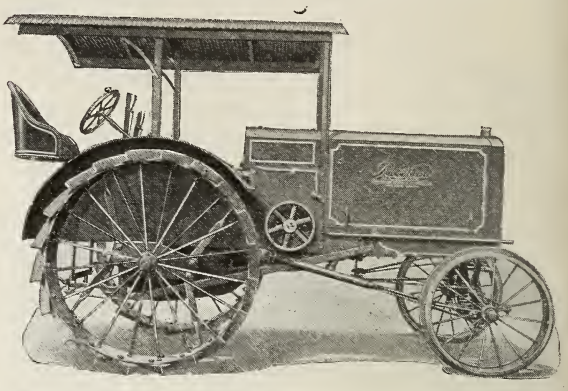
A 4-wheel tractor with 2 drive wheels and 2 steering wheels, guided and controlled by extensions from the seat of the implement drawn; 35 motor h. p.; 2 speeds forward, 1¾ and 2½ m. p. h. Motor: 4 cylinders vertical, 4¼x5¾ in.; recommended for gasoline or kerosene. Splash lubrication. Bearings: Self-aligning balls in transmission; cannon type plain in rear axle. Transmission: Selective type enclosed gears, always in mesh, speed changed by jaw clutches, gears machined and case hardened. Final drive: Enclosed bull pinions and gears. Drive wheels 60 in. high, 10 in. wide. Pulley 8 in. diam. Fuel capacity 25 gals. Ignition: Atwater-Kent battery and distributor. Enclosed governor. Kingston carburetor. Cooling: Honeycomb radiator, pump circulation; 20-in. fan. Spark plugs: ⅞ in. S. A. E.

POST TRACTOR CO., CLEVELAND, O.
POST TRACTOR.

A 2-plow tractor with 2 drive wheels in center, 1 in front and 1 in rear, and a balance wheel at each side; 12 h. p. on drawbar, 20 h. p. on belt; 1,500 lbs. pull at plowing speed; 3 speeds forward, 1¾, 3 and 5 m. p. h.; diameter turning circle 5 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,250. Motor: Golden, Belknap & Swartz, L head, 4 cylinders vertical, 3¾x4¼ in., 1,200 r. p. m.; fuel recommended, gasoline. Splash lubrication. Timken roller and ball bearings throughout. Transmission: Fuller, enclosed sliding gears. Final drive: Bevel gears, enclosed. Height of drive wheels 28 in., width 14 in. Pulley: 9x6½ in., 1,000 r. p. m.; controlled by independent clutch; belt speed 2,827 ft. per min. 1 fuel tank, 10 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Own governor. Schebler 1-in. carburetor. Cooling: Perfex radiator, thermosyphon circulation. Spark plugs: Sharp ⅞ in. regular. 3 rings to piston, 3-16 in. wide. Tractor dimensions: Length 118 in., width 64 in., height 60 in.; shipping weight 3,300 lbs. American Motors Co., New York City, foreign distributors.

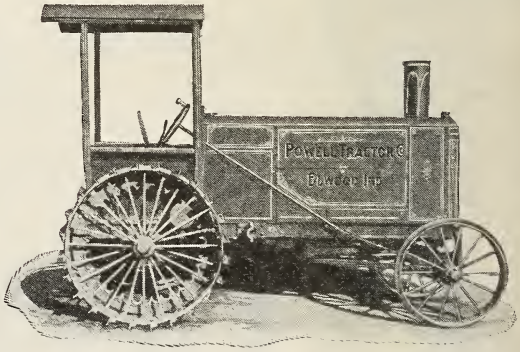
PORT HURON ENGINE & THRESHER CO., PORT HURON, MICH.
PORT HURON 12-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 11¾ h. p. on drawbar, 23½ h. p. on belt; 2,200 lbs. pull at 2 m. p. h.; recommended for 22 in. thresher; operating weight 6,000 lbs.; turning radius 6 ft. inside. Motor: Erd, valve in head, 4 cylinders vertical, 4x6 in., 900 r. p. m.; recommended fuel, kerosene; recommended oil, Mobiloil. Lubrication: Circulating splash. Bearings: Transmission, SKF balls and plain; balance plain.



Transmission: Friction type, 6 speeds forward and reverse, 1⅞ to 4 m. p. h. Final drive: Spur gears and spur pinions, all finished except differential bevels. Drive wheels 56 in. high, 10 in. wide. Pulley: 14x8 in., 650 to 1,065 r. p. m.; controlled by variable friction drive; belt speeds 2,380 to 3,900 ft. per min. 2 fuel tanks, kerosene 25 gals., gasoline 5 gals. Bennett air cleaner, centrifugal type. Ignition: Kingston high tension magneto with impulse starter. Pickering governor. Carburetor: Kingston, single bowl, 1¼ in. inlet; mixture heated. Cooling: Water; Perfex radiator, pump circulation. Spark plugs: ⅞ in. S. A. E. long shank. Hitch: 17 in. high; lateral adjustment 18 in., vertical 3 in. Frame spring mounted in front, solid in rear. Dimensions: Length over all 156 in., width 75 in., height including top 105 in.; wheel base 93 in.; shipping weight 6,000 lbs. not crated. Branches and distributors: Port Huron Co. of Illinois, Peoria, Ill.; Port Huron Machinery Co., Ltd., Des Moines, Ia., Minneapolis, Minn., and Lincoln, Neb.; David S. Hays, and John L. Denton, 24 State St., New York; Port Huron Engine & Thresher Co., Wichita, Kan., and Logansport, Ind.

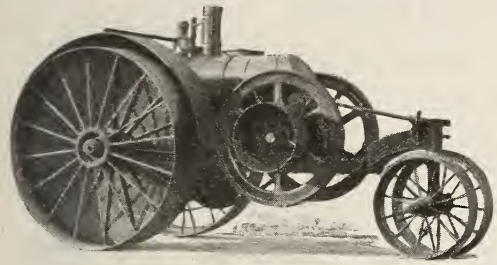
POWELL TRACTOR CO., ELWOOD, IND.
POWELL 16-30.



A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 34 h. p. on belt; recommended for 30-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2½ and 5 m. p. h.; diameter turning circle, 14 ft. outside; retail price f. o. b. factory Jan. 1, 1919, $1,785 (3-bottom plow included). Motor: Climax, L head, 4 cylinders vertical, 5x6½ in., 750 r. p. m.; fuel recommended, gasoline or kerosene. Lubrica-

tion: Internal force feed; Stanolind gas tractor oil recommended. Plain bearings, except balls in fan. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinions and gears, shielded. Height of drive wheels 48 in., width 12 in. Pulley: 14x7 in., 750 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,750 to 2,930 ft. per min. 2 fuel tanks, 2½ and 25 gals. Bennett centrifugal air cleaner. Dixie high tension magneto with impulse starter. Climax governor. Stromberg 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes 22-in. fan; fan belt pulleys 3¼ and 8x2 in.; length of belt 52 in., width 2 in. Champion spark plugs, ⅞ in. S. A. E. 3 rings to piston, 5x¼ in. Hitch: Lateral adjustment 18 in., vertical 8 in. Tractor dimensions: Length 133 in., width 72 in., height 94 in.; shipping weight 4,500 lbs.

POWER TRUCK & TRACTOR CO., DETROIT, MICH.
POWER.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 32.4 h. p. on belt; recommended for 20 to 24-in. thresher; 2,500 lbs. pull at plowing speed; 2 speeds forward, 1½ and 3 m. p. h.; diameter turning circle 17 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,485. Motor: Own make, valve in head, 1 cylinder horizontal, 9x12 in., 500 r. p. m.; fuel recommended, kerosene. Lubrication: Michigan mechanical oiler; heavy tractor oil recommended. Plain bearings. Transmission: Own make, enclosed gears, rough. Height of drive wheels 60 in.; width of right wheel 16 in., left wheel 10 in. Pulley: 20x10 in., 500 r. p. m.; mounted on crankshaft; belt speed 2,520 ft. per min. 1 fuel tank 15 gals. Dixie magneto. Own make governor. Own make 2¼-in. carburetor. Hopper cooling system. Champion ½-in. spark plugs. 4 rings to piston, 9x½ in. Lateral hitch adjustment 24 in. Tractor dimensions: Length 144 in., width 56 in., height 72 in.; shipping weight 4,200 lbs.

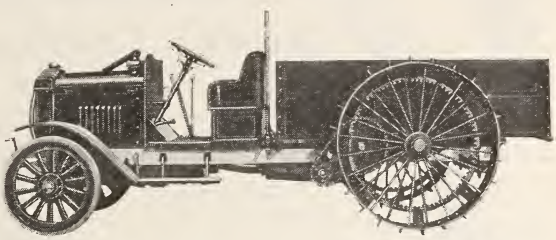
PULLET TRACTOR CO., MINNEAPOLIS.
PULLET.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; 40 h. p. on belt. Motor: Beaver, 4 cylinders vertical, 4¾x6 in.; recommended for kerosene. Lubrication: Internal force feed in motor; transmission and worm run in oil; 2 grease cups to steering knuckles. Timken roller bearings. Transmission: Enclosed cut gears, hardened. Final drive: Worm. Drive wheels 64 in. high, 12 in. wide, equipped with Loxon lugs. Remy electric starting, lighting, governing and ignition system; Willard storage battery. Perfex radiator.

R. & P. TRACTOR CO., ALMA, MICH.
R. & P. 12-20.

A 2 to 3-plow tractor with 2 P-T pad driving wheels and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; 2,200 lbs. pull at plowing speed; 3 speeds forward, 1 1-3, 2 1-3 and 4½ m. p. h.; diameter turning circle 24 ft. Motor: Waukesha Model B, T head, 4 cylinders 3¾x5¼, 1,000 r. p. m.; fuel recommended, gasoline. Bearings: Timken roller in wheels and rear axle, New Departure balls in transmission and jackshaft. Transmission: Fuller enclosed gears, finished. Final drive: Internal gear, enclosed. Height of drive wheels 40 in., width 11 in.; pad contact with ground 20 in. Pulley: 8x7½ in., 850 r. p. m.; controlled by motor clutch; driven through gears; belt speed 1,750 ft. per min. 1 fuel tank, 19 gals. Bennett centrifugal air cleaner. Eisemann magneto with impulse starter. Waukesha governor. Stromberg 1¼-in. carburetor. Cooling: Pump circulation through radiator; Oakes 18-in. fan; flat belt 1½ in. wide. Spark plugs, ⅞ in. S. A. E. Hitch: Lateral adjustment 15 in., vertical 8 in. Tractor dimensions: Length 108 in., width 65 in., height 60 in.; shipping weight 3,600 lbs.

REDDEN TRUCK & TRACTOR CO., HARVEY, ILL.
FARMER TRACTOR TRUCK 12-25.



A combination 3-plow tractor and 2-ton truck with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; recommended for 26-in. thresher; 2,000 lbs. pull at plowing speed; 1 speed change forward, 2½ m. p. h.; diameter turning circle 24 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,600. Motor: Buda, L head, 4 cylinders vertical, 4¼x5½ in., 900 r. p. m.; fuel recommended, gasoline. Force feed lubrication. Bearings: Front wheels, Bock roller; rear wheels, rear axle, transmission and jackshaft, Hyatt roller. Transmission: Bevel to jackshaft, no truck speed change gears employed. Final drive: Roller bull pinion and open chain. Height of drive wheels 54 in., width 10 in. Pulley: 16x12 in., 450 r. p. m.; controlled through motor clutch; driven by chain; belt speed 1,880 ft. per min.; 1 fuel tank, 20 gals. Bosch magneto with impulse starter. Pierce governor. Van Briggle 1¼ in. carburetor. Cooling: Chicago radiator, pump circulation; Oakes 16-in. fan; fan belt pulleys 3x1½ in.; flat belt 16 in. long and 1½ in. wide. A-C spark plugs, ⅞ in. Hitch: Lateral adjustment 12 in., vertical 4 in. Tractor dimensions: Length 190 in., width 67 in., height 64 in.; shipping weight 4,400 lbs.

REED FOUNDRY & MACHINE CO., KALAMAZOO, MICH.
REED "ONE-MAN" 10-20.

A 2-plow tractor with 2 drive wheels and 2 steering wheels; 10 h. p. on drawbar, 20 h. p. on belt; recommended for 22-in. thresher; 2,000 lbs. pull at plowing speed; 2 speeds forward, 2½ and 3½ m. p. h.; diameter turning circle 22 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,340. Motor: Waukesha, L head, 4 cylinders vertical, 4x5¾ in., 1,100 r. p. m.; fuel recommended, kerosene or gasoline. Hyatt roller bearings throughout except front wheels, which have plain. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gear, open. Height of drive wheels 60 in., width 12 in. Pulley: 12x6 in., 875 r. p. m.; controlled through motor clutch; driven through gears; belt speed 2,750 ft. per min. 2 compartment fuel tank, 20 and 10

For those "Bull" Gears and "Crawler" Treads

"TISCO" MANGANESE STEEL

Can Make Your Tractor a Better Machine

Consider the tremendous wear and tear your Tractor must undergo —the clashing rasp of gears, the terrific grinding action on the tread as it grips the soil beneath, scrapes over flinty rocks or scrambles ponderously through abrasive sand.

Those clashing gears—that grinding tread—must withstand that abrasion. But

HOW?

Put the answer to that problem up to us. Let us figure on your Tractor gears and tread of "TISCO" MANGANESE STEEL. Let us put to your service our 25 years of experience in handling this remarkable steel — unequalled in resistance to abrasive wear.

"TISCO" MANGANESE STEEL is the original manganese steel. In 1892 we turned out the first heat of manganese steel ever made in this country. We know that "TISCO" MANGANESE STEEL will make your tractor a better machine—a tractor that will "stand up" better—*sell* better—*stay* sold. Let us PROVE it.

Write for the data—NOW.

Taylor-Wharton Iron & Steel Company

High Bridge, N. J.

Subsidiary Companies { Wm. Wharton Jr. & Co., Inc., Easton, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.
Tioga Steel & Iron Co., Philadelphia, Pa.

"TISCO"

MANGANESE STEEL

gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Waukesha governor. Kingston 1¼-in. carburetor. Cooling: Modine radiator, pump circulation; Waukesha 20-in. fan; flat belt 1½x32½ in. Spark plugs: Splitdorf ⅞ in. S. A. E. 3 rings to piston ¼x4. Hitch: Lateral adjustment 30 in.; vertical 10 in. Tractor dimensions: Length 142 in., width 72 in., height 66 in.; shipping weight 4,750 lbs., plows and lift 750 lbs.; 300 cu. ft. packed for export.

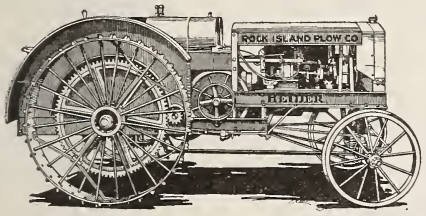
REED FOUNDRY & MACHINE CO., KALAMAZOO, MICH.

REED "ONE-MAN" 15-27.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 27 h. p. on belt; 3,000 lbs. pull at plowing speed; recommended for 26-in. thresher; 2 speeds forward, 2½ and 3½ m. p. h.; diameter turning circle 22 ft.; retail price Jan. 1, 1919, $1,665 f. o. b. factory. Motor: Waukesha, 4 cylinders vertical, L head, 4¼x5¾ in., 1,000 r. p. m.; recommended for kerosene and gasoline. Hyatt roller bearings throughout except plain in front wheels. Transmission: Own enclosed gears, finished. Final drive: Open pinions and gears. Drive wheels 60 in. high, 12 in. wide. Pulley: 12x6 in., 875 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,750 ft. per min. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Waukesha governor. Kingston 1½-in. carburetor. Cooling: Modine radiator, pump circulation; Waukesha 20-in. fan; flat belt 1½x32½ in. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to pistons, ¼x4¼ in. Lateral hitch adjustment 30 in., vertical 10 in. Tractor dimensions: Length 142 in., width 72 in., height 66 in.; shipping weight 5,000 lbs., plows and lift 900 lbs.

ROCK ISLAND PLOW CO., ROCK ISLAND, ILL.

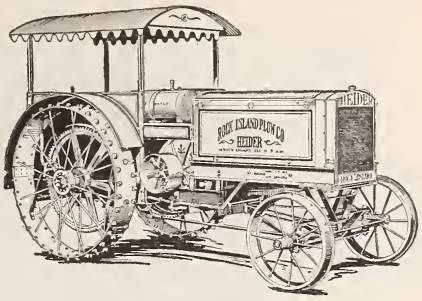
HEIDER 9-16 MODEL D.



A 2-plow tractor with 2 drive wheels and 2 steering wheels; 9 h. p. on drawbar, 16 h. p. on belt, own rating; recommended for 18-in. thresher; 1,700 lbs. pull at plowing speed; variable speed forward, 1 to 4 m. p. h.; diameter turning circle 25 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,070. Motor: Waukesha, L head, 4 cylinders vertical, 4¼x5¾ in., 800 r. p. m.; fuel recommended, kerosene or gasoline. Circulating splash lubrication. Bearings: Plain throughout, except ball bearings in fan. Transmission: Own make, open friction. Final drive: Open bull pinions and gears. Height of drive wheels 54 in., width 8 in. Pulley: 12x6 in., 700 r. p. m.; controlled by friction drive, mounted on discshaft; belt speed 2,200 ft. per min. 2 fuel tanks, 14 and 7 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Waukesha governor. Kingston 1-in. carburetor. Cooling: Perfex radiator, centrifugal pump circulation; Oakes 20-in. fan; fan belt pulleys, 7 in. diameter and 2 in. wide; flat belt, 40 in. long and 1½ in. wide. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to pistons, 4¼x¼ in. Hitch adjustment 11 in. each way. Tractor Dimensions: Length 130 in., width 68 in., height 60 in.; shipping weight 4,000 lbs.; 183 cu. ft. packed for export. Branches: Minneapolis, Minn.; Indianapolis, Ind.; Sioux Falls, S. D.; Omaha, Neb.; Kansas City, Mo.; Dallas, Tex.; Oklahoma City, Okla.

ROCK ISLAND PLOW CO., ROCK ISLAND, ILL.

HEIDER 12-20.



A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 20 h. p. on belt; 2,400 lbs. pull at plowing speed; recommended for 24 in. thresher; operating weight 6,000 lbs.; turning radius 25 ft. Motor: Waukesha, 4 cylinders vertical, 4½x6¾ in., 750 r. p. m.; recommended fuel, gasoline or kerosene. Lubrication: Circulating splash. Plain bearings. Transmission: Open friction type, 7 speeds forward. Final drive: Spur pinions and gears. Rear axle diameter 2½ in. Drive wheels 57 in. high, 10 in. wide. Pulley: 14x7 in., 600 r. p. m.; driven through transmission; belt speed 2,200 ft. per minute. 2 fuel tanks, 14 and 7 gals. Oil capacity 1½ gals. Ignition: Dixie high tension magneto with impulse starter. Waukesha governor. Carburetor: Kingston, single bowl, 1⅜ in. inlet; heated manifold. Cooling: Water; Perfex radiator, pump circulation. Spark plugs: Splitdorf, ⅞ in. 18 threads. Hitch: 20 in. high, 24 in. lateral adjustment. Frame spring mounted in front, solid in rear. Dimensions: Length over all 144 in., width 74 in., height 96 in.; wheel base 96 in.; shipping weight 6,000 lbs.; 255 cu. ft. packed for export. Branches as previously listed.

ROSS MOTORS, LTD., CHICAGO.

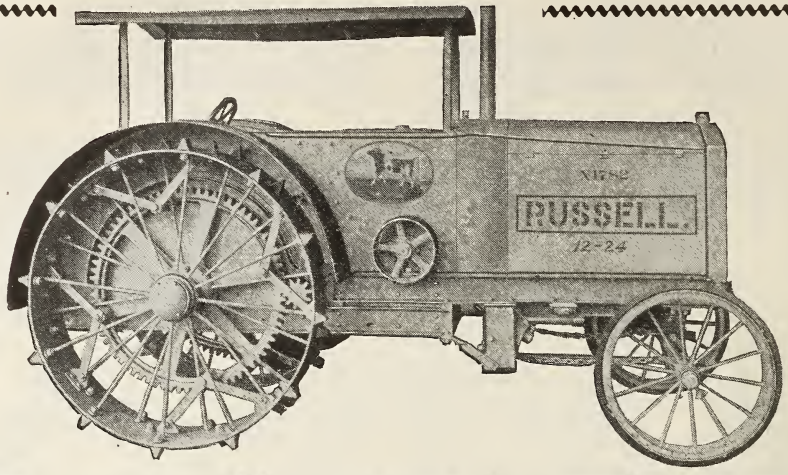
ROSS-UTILITY 15-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 24-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 1¾ and 4 m. p. h.; diameter turning circle 11½ ft.; retail price f. o. b. factory Jan. 1, 1919, $985. Motor: Own make, T head, 4 cylinders vertical, 4¼x6 in., 900 r. p. m.; fuel recommended, kerosene or distillate. Lubrication: Internal force feed. Roller bearings throughout, except cooling fan, which has balls. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gears, open. Height of drive wheels 60 in., width 12 in. Pulley: 12x7 in., 900 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,600 ft. per min. 2 fuel tanks, 5 and 20 gals. Bosch magneto with impulse starter. Own make governor. Own 1¼-in. carburetor. Cooling: Own radiator, centrifugal pump circulation; 12-in. fan; flat 1-in. belt. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to piston, ¼ in. wide. Tractor dimensions: Length 11 ft. 6 in., width 7 ft. 2 in., height 5 ft.; shipping weight 4,250 lbs. Branches: St. Louis, Mo., New York, N. Y.

ROYER TRACTOR CO., WICHITA, KAN.

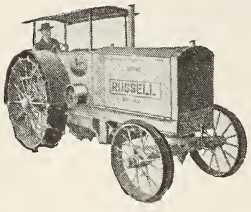
ROYER 12-25, MODEL D.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; 1 speed change forward, 1 to 3 m. p. h.; diameter turning circle 30 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,650. Motor: Erd, Model T, valve in head, 4 cylinders vertical, 4x6 in., 700 to 1,000 r. p. m.; fuel recommended, kerosene. Lubrication: Circulating splash; recommend



RUSSELL TRACTORS

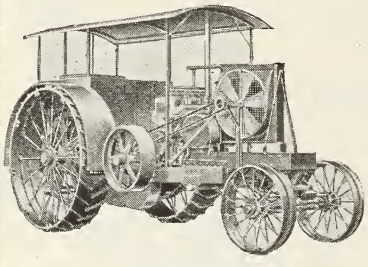
In Successful Use more than 40 years



12—24,
15—30
and
20—40

ABSOLUTE RELIABILITY. Russell has been making **reliable** tractors since 1876; steam at first, later gasoline and oil. The Russell tractor you buy or sell is free from experimental features, and like others of the Russell Line is built strong, sturdy and durable, and stands up under severe service.

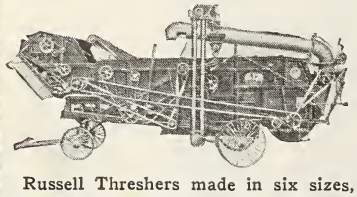
Russell features include 4 wheels, 4 cylinders, 4 sizes, two speeds forward on **direct drive,** and reverse; reinforced high-tensile hot-riveted channel steel frame; high tension magneto, impulse starter; best roller bearings on 3 models. In short, Russell quality and thorough-going construction throughout.



Russell Giant
40—80

COMPLETE LINE. There is a Reliable Russell Tractor for every size farm, up to one of the most powerful tractors built; Russell Threshing Outfits are made in six sizes from the 36x60 down to the new 20x34 for individual and community use. Russell engines, saw mills and machinery have been RELIABLE since 1842.

SERVICE AND DISTRIBUTION. Our agencies and supply depots are conveniently located through the country and the Russell Service Organization covers all localities with trained tractor and machinery service men.



Russell Threshers made in six sizes, including the small 20x34 for individual or community use.

Get the Old Reliable Line working FOR you instead of AGAINST you—send today for new catalogs and our Dealer Proposition.

THE RUSSELL & CO., Massillon, Ohio

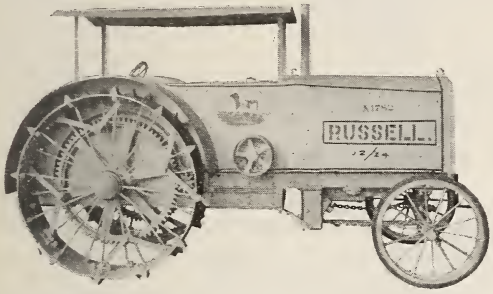
Distributing Agents—Peoria, Indianapolis, Portland, Spokane, San Jose, Council Bluffs, St. Joseph, Wichita, St. Paul, Chattanooga, Stuttgart (Ark.), Crowley (La.), Toledo, Goshen, and Milwaukee

Tractors, Engines **RUSSELL** Threshing Machinery

THE OLD RELIABLE LINE

Mobiloil B in summer, A in winter. Bearings: Front wheels, C. I. removable box; rear wheels and rear axle, bronze bushings; transmission and jackshaft, babbitt; cooling fan, balls. Transmission: Own design Rockwood fiber friction, reduction gears enclosed, rough. Final drive: Open chain. Height of drive wheels 54 in., width 14 in. Pulley: 18x8 in., 550 to 750 r. p. m.; controlled through motor friction, driven through spur friction; belt speed 2,585 to 3,525 ft. per min. 2 fuel tanks, 20 and 3 gals. Air cleaner: Own, air through water. Ignition: Bosch or Berling magneto with impulse starter. Pickering governor. Kingston 1¼-in. carburetor. Cooling: Perfex or Ideal radiator, centrifugal pump circulation; Erd 20-in. fan. Spark plugs: Splitdorf or Champion, size and pitch, ⅞ in. Buick. 3 rings to piston, 4x¼ in. Lateral hitch adjustment 24 in. Tractor dimensions: Length 11 ft., width 6 ft. 9 in., height 8 ft., with cab; shipping weight 5,000 lbs.; 460 cu. ft. packed for export.

THE RUSSELL & CO., MASSILLON, O.
RUSSELL JR. 12-24.

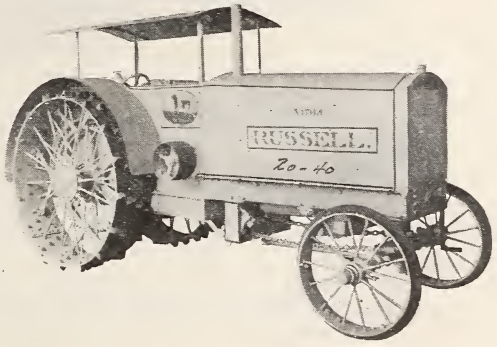


A 2-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 24 h. p. on belt; 2,000 lbs. pull at plowing speed; recommended for 24-in. thresher; 2 speeds forward, 2 and 2.4 m. p. h. Motor: Waukesha, 4 cylinders vertical, 4½x5¾ in., 1,000 r. p. m.; recommended for kerosene and gasoline. Lubrication: Madison-Kipp force feed oiler and splash. Bearings: Rollers in transmission and rear axle. Transmission: Enclosed gears, cut and heat treated. Final drive: Bull pinions and gears, enclosed. Drive wheels 53 in. high, 10 in. wide. Pulley: 12½x7 in., 900 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 2,950 ft. per min. 2 fuel tanks, 3 and 20 gals. Bennett centrifugal air cleaner. Bosch magneto. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation. Spark plugs ⅞ in. S. A. E. Tractor dimensions: Length 142 in., width 67 in., height 96 in.; shipping weight 6,200 lbs.

THE RUSSELL & CO., MASSILLON, O.
RUSSELL LILTTLE BOSS 15-30.

A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; 3,000 lbs. pull at plowing speed; recommended for 27-in. thresher; 2 speeds forward, 2 to 2.4 m. p. h. Motor: Waukesha, 4 cylinders vertical, 4½x6¾ in., 950 r. p. m.; recommended for kerosene and gasoline. Lubrication: Madison-Kipp force feed oiler and splash. Roller bearings in transmission and rear axle. Transmission: Enclosed gears, finished. Final drive: Open bull pinions and gears. Drive wheels 53 in. high, 10 in. wide. Pulley: 12½x7 in., 870 r. p. m.; driven through gears; belt speed 2,850 ft. per min. 2 fuel tanks, 3 and 20 gals. Bennett centrifugal air cleaner. Dixie magneto. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation. Spark plugs ⅞ in. S. A. E. Tractor dimensions: Length 148 in., width 67 in., height 96 in.; shipping weight 6,900 lbs.

THE RUSSELL & CO., MASSILLON, O.
RUSSELL BIG BOSS 20-40.

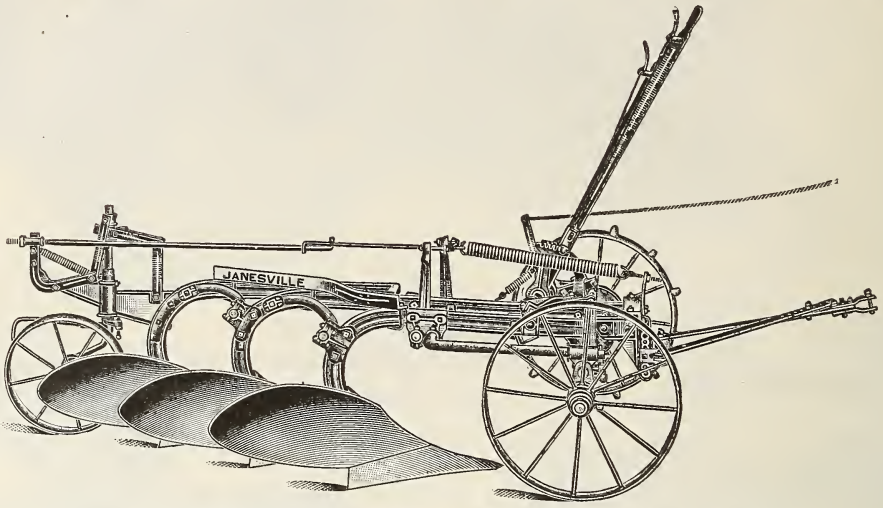


A 4 to 5-plow tractor with 2 drive wheels and 2 steering wheels; 20 h. p. on drawbar, 40 h. p. on belt; 4,000 lbs. pull at plowing speed; recommended for 30-in. thresher; 2 speeds forward, 2 to 2.4 m. p. h. Motor: Waukesha, 4 cylinders vertical, 5½x7 in., 825 r. p. m.; recommended for kerosene and gasoline. Lubrication: Madison-Kipp force feed oiler and splash. Roller bearings in transmission and rear axle. Transmission: Enclosed gears, finished. Final drive: Open bull pinions and gears. Pulley: 12½x8 in., 840 r. p. m.; driven through gears; belt speed 2,755 ft. per min. 2 fuel tanks, 5 and 30 gals. Bennett centrifugal air cleaner. Dixie magneto. Kingston 1½-in. carburetor. Cooling: Perfex radiator, pump circulation. Spark plugs ⅞ in. S. A. E. Tractor dimensions: Length 162 in., width 65 in., height 87 in.; shipping weight 7,600 lbs.

THE RUSSELL & CO., MASSILLON, O.
RUSSELL GIANT 40-80.

An 8 to 10-plow tractor with 2 drive wheels and 2 steering wheels; 40 h. p. on drawbar, 80 h. p. on belt; 8,000 lbs. pull at plowing speed; recommended for 36-in. thresher; 2 speeds forward, 2 to 3¼ m. p. h. Motor: Own, 4 cylinders vertical, 8x10 in., 525 r. p. m.; recommended for kerosene or gasoline. Lubrication: Madison-Kipp force feed oiler and splash. Plain bearings throughout. Transmission: Enclosed gears, finished. Final drive: Open bull pinions and gears. Drive wheels 84 in. high, 22 in. wide. Pulley: 24x10 in., 525 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 3,300 ft. per min. 2 fuel tanks, 22 and

JANESVILLE

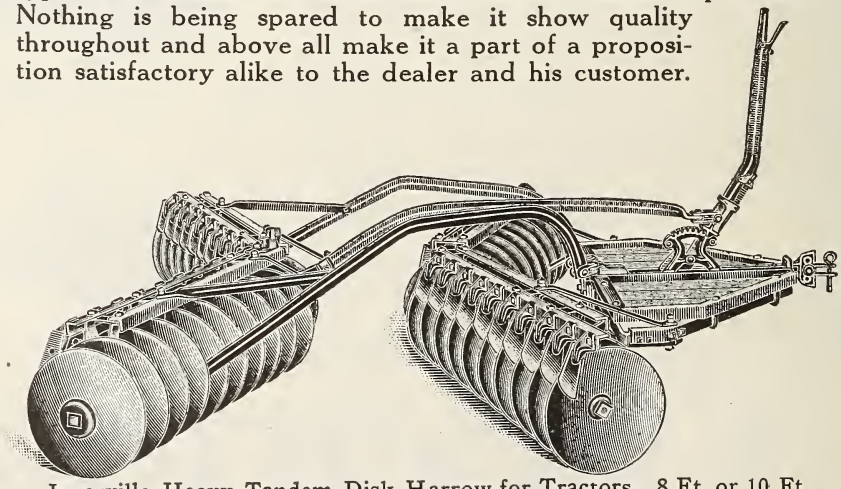


Janesville 2-3 Bottom Tractor Plow. Made Also in Heavy 3-4 Type.

Are you really satisfied with your present lines of **HORSE** and **POWER** implements. Now is the time to make an important decision—decide carefully, analize the Janesville Proposition.

Being based on sound business principles it anticipates the necessities of the future and meanwhile you and your business prosper.

The Janesville Line of Implements is being expanded by new types and models of **Horse** and **Tractor Drawn** implements. Nothing is being spared to make it show quality throughout and above all make it a part of a proposition satisfactory alike to the dealer and his customer.



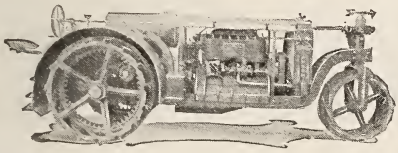
Janesville Heavy Tandem Disk Harrow for Tractors. 8 Ft. or 10 Ft. 16″ or 18″ Round Blades.

JANESVILLE MACHINE COMPANY **Janesville, Wis.**

88 gals. Bennett centrifugal air cleaner. Bosch magneto. Kingston 2-in. carburetor. Cooling: Perfex radiator, pump circulation. Tractor dimensions: Length 222 in., width 144 in., height 130 in.; shipping weight 24,000 lbs.

SAMSON SIEVE-GRIP TRACTOR CO., STOCKTON, CAL.

SAMSON SIEVE-GRIP S25.



A 3-plow tractor with 2 sieve type drive wheels and 1 steering wheel; 12 h. p. on drawbar, 28.3 h. p. on belt; recommended for 30-in. thresher; 1,800 lbs. pull at plowing speed; 2 speeds forward, 1¾ to 3½ m. p. h.; diameter turning circle 16 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,750. Motor: Own make, L head, 4 cylinders vertical, 4¼x6¾ in., 650 r. p. m.; fuel recommended, distillate. Lubrication: Circulating splash and force feed, oil pump driven from camshaft; oil recommended, paraffine base, heavy in summer and medium in winter. Bearings: Front wheels, shell bearing, bronze back, babbitt lined; real wheels, rear axle, transmission, jackshaft, Samson roller. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinions and gears, open. Height of drive wheels 41 in., width 18 in. Pulley: Diameter, optional; face 8 in. maximum; 750 r. p. m.; controlled by motor clutch; pulley shaft direct connected with engine crankshaft; belt speed, 12 in. diameter pulley, 2,360 ft. per min. 1 fuel tank, 18 gals. Air cleaner: Own make, Nodust-Moisto-Rizer. Ignition: Bosch magneto with impulse starter. Governor: Own make, ball and disc type. Holley or Marvel 1¼-in. carburetor. Cooling: GMC radiator, pump circulation; own make 19-in. fan; diameter of upper fan belt pulley 3¼ in., width 2¾ in.; diameter of lower fan belt pulley 9 in., width 2¾ in.; flat belt, 45¾x2½ in. Spark plugs, A. C. Titan, ⅞ in. S. A. E. 3 rings to piston, 4¼x1¼ in. Hitch: Lateral adjustment 36 in., vertical 13, 16 or 19 in. high. Tractor dimensions: Length 12 ft. 6 in., width 5 ft. 3 in., height 4 ft. 2 in.; shipping weight 5,800 lbs.; 316 cu. ft. packed for export.

SAMSON TRACTOR CO., JANESVILLE, WIS.

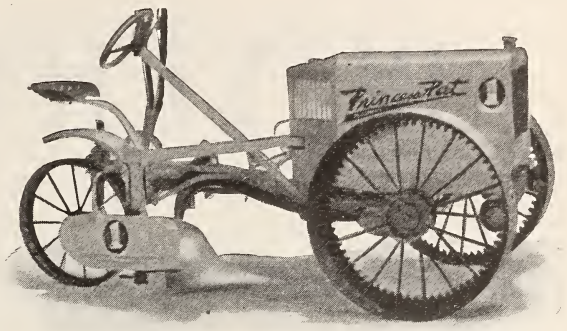
SAMSON MODEL M.

A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; retail price advertised Jan. 1, 1919, $650 f. o. b. factory. Motor: 4 cylinders vertical, cast en bloc. Force feed lubrication. Transmission: Enclosed gears, finished. Final drive: Direct to live axle. Equipped with belt pulley; controlled by motor clutch; driven through gears. Own water type air cleaner. Built-in governor. Tubular radiator. Company has also announced a 3-4 plow tractor (model A) at $950, and a high frame type tractor (model D) suitable for cultivating with the power of 4 horses for $450.

SCIENTIFIC FARMING MACHINERY CO., MINNEAPOLIS.

PRINCESS PAT 10-18.

A combination of a 3-wheel tractor driving and steering through 2 wheels in front and the "Once-Over" tiller which prepares the seed bed and plants at one operation; 10 h. p. on drawbar, 18 h. p. on belt; 1,500 lbs. pull at plowing speed; recommended for 22-in. thresher; 2 speeds forward, 2½ to 4½ m. p. m.; 22 ft. turning circle; retail price Jan. 1, 1919, $1,185 f. o. b. factory. Motor: Waukesha, L head, 4 cylinders vertical, 3½x5¼ in., 1,050 r. p. m.; recommended for gasoline. Splash lubrication. Hyatt roller bearings throughout. Transmission: Enclosed gears, finished. Final drive: Enclosed bull pinions and gears. Drive wheels 40 in. high, 8 in. wide. Pulley: 12x6 in., 890 r. p. m.; controlled by motor clutch; driven through



gears; belt speed 2,800 ft. per min. Fuel capacity 12 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Built-in governor. Bennett 1-in. carburetor. Cooling: Perfex radiator, thermo-syphon circulation; 14-in. Hy-Duty fan; pulleys 3 and 6x1½ in.; flat belt 1¼x38 in. Champion spark plugs, ⅞ in. S. A. E. 2 ¼-in. rings to pistons. Tractor dimensions: Length 112 in., width 57 in., height 60 in.; shipping weight 1,900 lbs.; 100 cu. ft. packed for export. Distributors: Hugh Park Foundry Machinery Co., Oshawa, Ont.; Melchior, Armstrong & Dessau, New York City.

SHELBY TRACTOR & TRUCK CO., SHELBY, O.

SHELBY 9-18.

A 2-plow tractor with 2 drive wheels and 2 steering wheels; 9 h. p. on drawbar, 18 h. p. on belt; recommended for 24-in. thresher; 3 speeds forward, 1¾, 2½ and 5 m. p. h.; diameter turning circle 21 ft. Motor: Waukesha, L head, 4 cylinders vertical, 3¾x5¼ in., 1,100 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Circulating splash and internal force feed. Bearings: Wheels, Timken roller; rear axle, ball and roller; transmission, jackshaft and cooling fan, ball. Transmission: Fuller enclosed gears, finished. Final drive: Internal gear, enclosed. Height of drive wheels 42 in., width 12 in. Pulley: 10x6½ in., 950 r. p. m.; controlled by motor clutch; driven through gears; belt speed, 2,500 ft. per min. 2 compartment fuel tank, 12 and 5 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Waukesha governor. Kingston 1-in. carburetor. Cooling: Spery radiator, pump circulation; Oakes 18-in. fan; flat belt, 1¼ in. wide. Spark plugs: Splitdorf, ⅞ in. S. A. E. 3 rings to piston, 3¾x1¼ in. Lateral hitch adjustment 24 in., vertical 3 in. Tractor dimensions: Length 118 in., width 66 in., height 66 in.; shipping weight 3,750 lbs.

SHORT TURN TRACTOR CO., BEMIDJI, MINN.

SHORT TURN 20-30.

A 3-plow, 3-wheel tractor with 1 driver; 30 b. h. p.; recommended for 20 in. thresher; turning radius 4 ft.; retail price $1,350 f. o. b. factory. Motor: Valve in head, 4 cylinders vertical, 4x6 in., 900 r. p. m.; recommended fuel, gasoline or kerosene. Lubrication: Circulating splash. Plain bearings. Transmission: En-

closed cut gears, 1 speed forward, 2½ m. p. h. Final drive: Chain. Drive wheel 51 in. high, 24 in. wide. Pulley size optional, operating at 900 r. p. m.; controlled by motor clutch; driven direct from motor; an 11-in. pulley will give the standard belt speed of 2,600 ft. per minute. 2 compartment fuel tank, gasoline 5 gals., kerosene 15 gals. Air cleaner, optional. Ignition: Dixie high tension magneto with impulse starter. Pickering governor. Carburetor optional. Cooling: Water; Perfex radiator, pump circulation. Spark plugs: Splitdorf, ⅞ in., 18 threads. Floating hitch. Frame mounted solid. Dimensions: Length over all 98 in., width 82 in., height 66 in.; wheel base adjustable from 36 in. to 96 in.

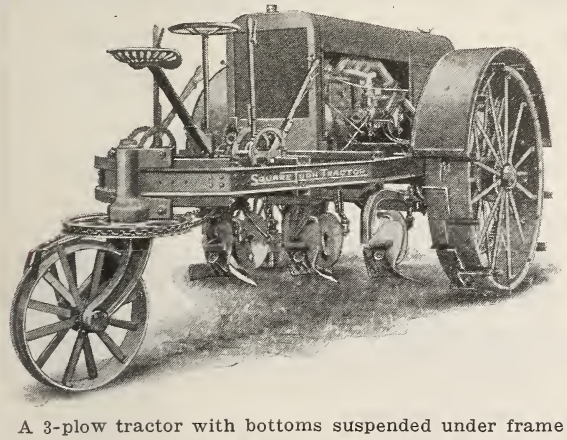
SOUTHERN MOTOR MFG. ASSN., LTD., HOUSTON, TEX.

RANGER.

A 2-plow (12-in. bottoms) tractor with 4 wheels, all drivers; 6 h. p. on drawbar, 12 h. p. on belt; 1,600 lbs. pull at plowing speed; diameter turning circle, 108 in.; retail price f. o. b. factory Jan. 1, 1919, $750. Motor: Le Roi, L head, 4 cylinders vertical, 3⅛x4½ in., 1,000 r. p. m.; fuel recommended, gasoline. Circulating splash lubrication. Plain bearings throughout, except ball bearing fan. Transmission by belt. Height of wheels 30 in., width 4½ in. Pulley: 8x6 in., 350 r. p. m.; driven through gears; belt speed 735 ft. per min. Capacity of fuel tank, 10 gals. Dixie magneto with impulse starter. Le Roi governor. Zenith carburetor. Cooling: Ideal radiator, thermo-syphon circulation; 14-in. fan; flat belt. Spark plugs, ⅞ in. S. A. E. 3 rings to piston, 3-16 in. Hitch: Lateral adjustment 10 in., vertical 6 in. Tractor dimensions: Length 84 in., width 110 in., height 84 in.; shipping weight 2,200 lbs.

SQUARE TURN TRACTOR CO., NORFOLK, NEB.

SQUARE TURN.



A 3-plow tractor with bottoms suspended under frame with 2 drive wheels in front and 1 steering wheel in rear; 18 h. p. on drawbar, 38 h. p. on belt; recommended for 30-in. thresher; 3,800 lbs. pull at plowing speed; 1 speed forward, 2¼ m. p. h.; diameter turning circle 130 in.; retail price f. o. b. factory Jan. 1, 1919, $1,875. Motor: Climax, L head, 4 cylinders vertical, 5x6½ in., 850 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed; recommend Mobiloil B for summer and A for winter use. Timken roller bearings throughout, except cooling fan has balls. Transmission: Own make, open friction, reduction gears, finished. Final drive: Bull pinion and gears, shielded. Height of drive wheels 60 in., width 12 in. Pulley: 12x8 in., 850 r. p. m.; controlled by friction clutch; belt speed 2,670 ft. per min. 2 fuel tanks, 30 and 4 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Climax governor. Stromberg 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; Cakes 22-in. fan; fan belt pulleys, 3¼ and 8 in. diameter, 2-in. face; flat belt, 52x2 in. Spark plugs: Champion ⅞ in. S. A. E. 3 rings to piston, 5x1¼ in. Lateral hitch adjustment 20 in., vertical 14 in. Tractor dimensions: Length 192 in., width 100½ in., height 76 in.; shipping weight 7,300 lbs.; packed for export, including plows, 15 ft. 2½ in.x6 ft. 7 in.x6 ft. 9 in.

STAR TRACTOR CO., FINDLAY, O.
SOLD BY
INDIANA SILO CO., ANDERSON, IND.
INDIANA.

A 1-plow (16-in. bottom) 2-wheel tractor, the operator riding on the implement drawn or on rear truck; 5 h. p. on drawbar, 10 h. p. on belt; 1,100 lbs. pull at plowing speed; 4 speeds forward, 1 to 4½ m. p. h.; diameter turning circle 14 ft. Motor: Le Roi, L head, 4 cylinders vertical, 3⅛x4½ in., 700 to 1,000 r. p. m.; fuel recommended, gasoline. Lubrication: Circulating splash; oil recommended, Mobiloil A. Bearings: Front wheels, roller; rear truck wheels, plain; transmission and cooling fan, balls; jackshaft, balls and rollers. Transmission: Own make, enclosed gears, forged, cut and hardened. Final drive: Chain, open. Height of wheels 50 in., width 12 in. Pulley: 7x6 in., 1,000 r. p. m.; driven through gears; belt speed 1,830 ft. per min. 1 fuel tank, 13 gals. Bennett centrifugal air cleaner. Atwater-Kent ignition. Kingston ⅞ in. carburetor. Cooling: Chandler radiator, thermo-syphon circulation; 14-in. fan; fan belt pulleys, 6 in. diameter and 1¼ in. wide; belt, 24 in. long and 1¼ in. wide. Spark plugs, ⅞ in. S. A. E. 4 rings to piston, 3⅛x3-16 in. Vertical hitch adjustment 14 in. Tractor dimensions: Length 128 in., width 54 in., height 62 in.; shipping weight 1,700 lbs. Indiana Silo Co. branches: Kansas City, Mo., Des Moines, Ia., Ft. Worth, Tex.

STINSON TRACTOR CO., SUPERIOR, WIS.

STINSON 18-36.

A 3 to 4-plow tractor with 2 drive wheels and 1 steering wheel adjustable to run in line with either drive wheel or in the center; 18 h. p. on drawbar, 36 h. p. on belt; 2 speeds forward, 2 to 3½ m. p. h. Motor: Beaver, 4 cylinders vertical, 4¾x6 in., 900 to 1,100 r. p. m.; recommended for kerosene. Force feed lubrication. Hyatt roller bearings throughout. Transmission: Enclosed spur gears, intermediate gear and main pinion cut. Final drive: Spur gear to live axle. Drive wheels 60 in. high, 12 in. wide. Pulley: 12x8½ in., operating motor speed; mounted on crankshaft; belt speed 2,825 ft. per minute at 900 r. p. m. 2 fuel tanks, 3 and 22 gals. Own water type air cleaner. Dixie magneto with impulse starter. Built-in governor. Kingston carburetor. Cooling: Todd cellular radiator, pump circulation; water capacity 10 gals.; 20-in. fan. Spark plugs ⅞ in. S. A. E. Tractor dimensions: Length 176 in., width 84 in., height 82 in.; shipping weight 6,350 lbs.; 314 cu. ft. packed for export.

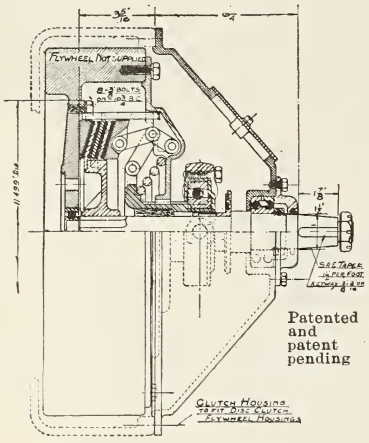
STONE TRACTOR MFG. CO., TEXARKANA, TEX.

STONE 24-40.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; 24 h. p. on drawbar, 40 h. p. on belt; recommended for 28-in. thresher; 4,000 lbs. pull at plowing speed; 2 speeds forward, 2¾ and 1¾ m. p. h.; pivots on either rear wheel; retail price f. o. b. factory Jan. 1, 1919, $1,425. Motor: Beaver, model J. A., 4 cylinders vertical, valve in head, 4½x6 in., 1,000 r. p. m.; fuel recommended, kerosene. Lubrication: Force feed and splash. Bearings: Roller and ball. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion

FIRST IN WAR FIRST IN PEACE

THE TRACTOR deserves and requires a better clutch, for the conditions of service impose strains that approach the critical. The necessary ruggedness has been built into the new



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Extremely easy of disassemblage—few working parts—no adjustments necessary—in every way to be classed as "fool-proof."

The only upkeep is the occasional renewal of the fibre disks, and that is inexpensive and easily done.

You get tractor power with horse reliability with the new "M & E" Dry Disc Clutch.

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and gears, enclosed. Height of drive wheels 48 in., width 14 in. Pulley: 12x7 in., 1,000 r. p. m.; controlled by motor clutch; driven through gears; belt speed 3,000 ft. per min. 2 fuel tanks, 2 and 18 gals. Dixie magneto with impulse starter. Beaver governor. Kingston 1¼-in. carburetor. Cooling: Eureka radiator, centrifugal pump circulation; Beaver 20-in. fan; fan belt pulleys, 8 and 3 in.x1½ in.; flat belt, 34x1½ in. Spark plugs, ⅞ in. S. A. E. Lateral hitch adjustment 38 in. Tractor Dimensions: Length 126 in., width 78 in., height 60 in.; shipping weight 5,000 lbs.

STRITE TRACTOR CO., NEW YORK.

STRITE 18-30.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; 18 h. p. on drawbar, 30 h. p. on belt; recommended for 32-in. thresher; 3,000 to 4,000 lbs. pull at plowing speed; 4 speeds forward, 2¼ to 4¼ m. p. h.; diameter turning circle 12 ft. inside and 24 ft. outside circle; retail price f. o. b. factory Jan. 1, 1919, $2,250. Motor: Climax, L head, 4 cylinders vertical, 5x6½ in., 800 r. p. m.; fuel recommended, gasoline or kerosene. Force feed lubrication. Bearings: Front wheels, plain; all others Hyatt roller. Transmission: Foote enclosed gear, finished and hardened. Direct axle drive. Height of drive wheels 54 in., width of rims 10 in.; with lugs 16 in. Pulley: 16½x8 in., 563 to 600 r. p. m.; controlled by motor clutch; belt speed 2,200 to 2,600 ft. per min. 2 compartment fuel tank, 5 and 24 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Climax enclosed governor. Stromberg or Kingston 1½-in. carburetor. Cooling: S-J radiator, pump cirrculation; Oakes 22-in. fan; fan belt pulleys, 3½x2 in.; flat belt, 2 in. wide. Spark plugs: Splitdorf ⅞ in. S. A. E. 3 rings to piston, width ¼ in. Lateral hitch adjustment 30 in. Tractor dimensions: Length 140 in., width 72 in., height 60 in.; shipping weight 5,300 lbs.

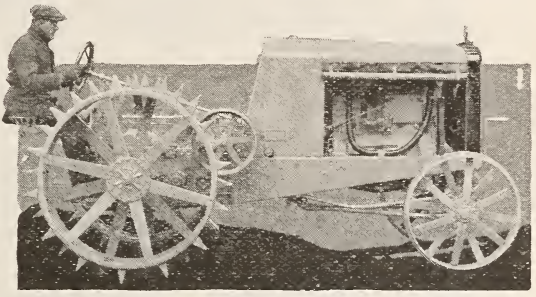
SUN TRACTOR CO., COLUMBUS, O.

SUN 8-16.

A general purpose 2-plow tractor and cultivator combined, driving and steering through 2 wheels, driver riding on implement attached; 8 h. p. on drawbar, 16 h. p. on belt; 2 speeds forward, 2½ and 5 m. p. h.; diameter turning circle, approximately 14 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,250. Motor: Herschell-Spillman L head, 4 cylinders vertical, 3¼x5 in., 1,200 r. p. m.; fuel recommended, gasoline. Internal force feed lubrication; heavy oil in summer and medium in winter. Bearings: Wheels, Hyatt roller; transmission, Timken roller and Hess-Bright ball; jackshaft, Timken and Hyatt roller; cooling fan, ball. Transmission: Own make, enclosed gears, finished and heat treated. Final drive: Chain, open. Height of wheels 54 in., width 8 in. Pulley: 8x8 in., 1,200 r. p. m.; driven through gears; belt speed 2,520 ft. per min. 1 fuel tank, 12 gals. Ignition: North-East distributor with North-East starting and lighting system. Kingston 1¼-in. carburetor. Cooling: Special radiator, thermo-syphon circulation; Oakes 20-in. fan; width of fan belt pulleys 1½ in.; flat belt 28 in. long and 1½ in. wide. A-C Titan spark plugs, ⅞ S. A. E. 3 rings to piston, 3½x3-16 in. Hitch: Vertical adjustment to any desired position. Tractor dimensions: Length 8 ft. with truck attached, width 66 in., height 76 in.; shipping weight 3,000 lbs.

S. W. H. ENGINEERING CO., CLEVELAND, O.

S. W. H. 15-30.



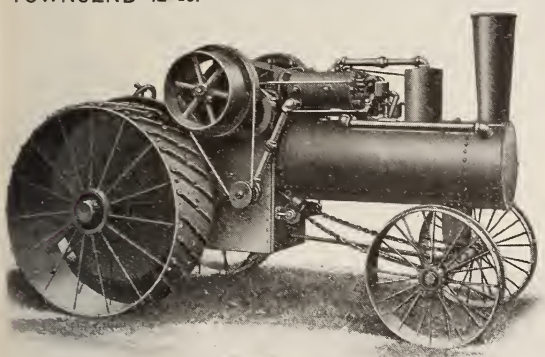
A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 30 h. p. on belt; recommended for 28 to 30-in. thresher; 3,000 lbs. pull at plowing speed; 2 speeds forward, 2⅓ and 3½ m. p. h., interchangeable gearing permitting varying from 1½ to 10 m. p. h.; diameter turning circle 30 ft. Motor: Valve in head, 4 cylinders vertical, 4¾x6 in., 900 to 1,000 r. p. m.; fuel recommended, gasoline or kerosene. Lubrication: Internal force feed; Mobiloil B recommended for summer use, one-half Mobiloil B and one-half Mobiloil Arctic for winter. Bearings: All Hyatt roller except transmission, which has Hyatt roller and New Departure balls. Transmission: Own make, enclosed gears, finished. Live rear axle drive. Height of wheels 48 in., width 12 in. Pulley: 18x6½ in., 550 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,600 ft. per min. 2 compartment fuel tank, 25 and 3 gals. High tension magneto with impulse starter. Governor: Centrifugal furnished with engine. Stromberg 1¼-in. carburetor. Cooling: Modine-Spirex, pump circulation; thermostat control; Hy-Duty 21-in. fan; flat belt. Spark plugs: Champion-Toledo, ⅞ in. S. A. E. Lateral hitch adjustment 24 in. Tractor dimensions: Length 12 ft. 2 in., width 64½ in., height 5 ft. 6 in.; shipping weight 4,800 lbs.

TEXAS TRUCK & TRACTOR CO., DALLAS, TEX.

WHARTON.

A 4 to 6-plow tractor with 4 wheels, all drivers; 20 h. p. on drawbar, 40 h. p. on belt; recommended for 32-in. thresher; 1 speed change forward, 2¾ m. p. h.; turns in its own length; retail price f. o. b. factory Jan. 1, 1919, $1,485. Motor: Waukesha (bore and stroke not given) or Climax, L head, 4 cylinders vertical, 5x6½ in., 800 to 900 r. p. m.; fuel recommended, kerosene. Lubrication: Force feed and splash. Transmission: Enclosed gears, finished. Live axle drive, enclosed pinions and gears and worm. Pulleys: 16x8 and 12x6 in., 800 to 900 r. p. m., controlled by motor clutch, driven through gears. 2 fuel tanks, 3 and 20 gals. Climax air cleaner. Ignition: Eisemann with Waukesha engine, Dixie with Climax. Governor: Centrifugal ball type. Own carburetor. Cooling: Perfex radiator, centrifugal pump circulation. Tractor dimensions: Length 8 ft. 6½ in., width 66 in., height 71 in. without top; shipping weight 3,400 lbs.

TOWNSEND MFG. CO., JANESVILLE, WIS.
TOWNSEND 12-25.



A 2 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; recommended for 24 to 28-in. thresher; 3,000 lbs. pull at plowing speed, 2½ m. p. h.; diameter turning circle 15 ft. Motor: Own make, valve in head, 2 cylinders horizontal twin, 7x8 in., 500 r. p. m.; fuel recommended, kerosene. Lubrication: Madison-Kipp force feed oiler; recommend Mobiloil B for summer, Mobiloil A for winter. Plain bearings throughout. Transmission: Own make, enclosed spur gears, part finished. Final drive: Bull pinion and gear, enclosed. height of drive wheels 56 in., width 18 in. Pulley: 20x8 in., 500 r. p. m.; controlled by independent friction clutch; mounted on crankshaft; belt speed 2,615 ft. per min. 1 fuel tank, 18 gals. Dixie magneto with impulse starter. Own make governor. Own make 1½-in. carburetor. Cooling: Own tubular radiator, pump circulation. Spark plugs: ½ in. standard pipe thread. 3 rings to piston, 7x⅜ in. Lateral hitch adjustment 30 in. Tractor dimensions: Length 11 ft. 8 in., width 6 ft. 6 in., height 6 ft. 6 in.; shipping weight, approximately 6,000 lbs.; packed for export, approximately 500 cu. ft.

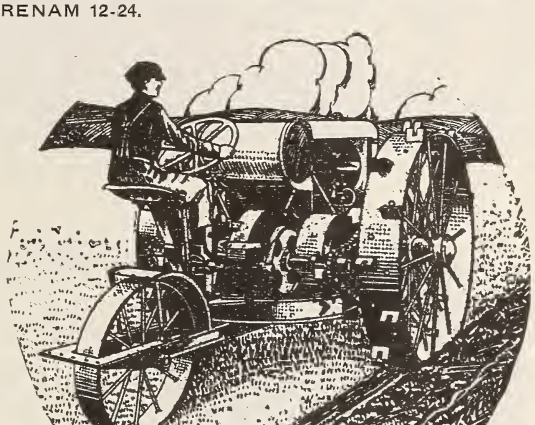
TRACTION ENGINE CO., BOYNE CITY, MICH.
HEINZE 30-40.

A 3 to 4-plow tractor with all 4 wheels drivers; steered by applying power on one side and braking other; 30 to 40 h. p. on belt at 1,200 r. p. m.; 3,600 to 4,000 lbs. pull at drawbar on hard sod; 3 speeds forward, direct drive at 3 m. p. h. Motor: Own, L head, 4 cylinders vertical, 4¼x6 in., 1,200 r. p. m.; recommended for kerosene or gasoline; removable sleeves in cylinders; motor spring supported. Splash lubrication. Hyatt rollers and annular ball bearings throughout. Transmission: Enclosed gears, finished. Final drive: Worm to differential shaft, roller chain to wheels. Wheels 46 in. high, 12 in. wide with cleats. Pulley: 8x8 in., 1,200 r. p. m.; mounted on crankshaft; belt speed 2,520 ft. per min. 2 fuel tanks, 2 and 20 gals. Magneto ignition. Centrifugal governor. Electric generator for lights. Cellular radiator, pump circulation; 20-in. fan driven by 2-in. belt. 6 7-32-in. rings to each piston. Adjustable hitch. Tractor dimensions: Length 10 ft. 5 in., width 6 ft., height without canopy 5 ft. 2 in., with canopy 7 ft. 2 in.; weight 4,000 lbs.

TRACTION MOTOR CORP., KALAMAZOO, MICH.
TRACTION MOTOR.

A 4-plow tractor with 2 drive wheels and 2 steering wheels; recommended for 32-in. thresher; 3 speeds forward. Motor: Herschell-Spillman, L head, 8 cylinders V, 3¼x5 in.; governed to 1,600 r. p. m.; fuel recommended, gasoline. Lubrication: Internal force feed; oil recommended, heavy Polarine. Bearings: Front wheels, Timken roller; rear axle, transmission and jackshaft, Hyatt roller; cooling fan, balls. Transmission: Own make, enclosed selective gears, finished. Final drive: Bull pinion and gear, enclosed. Height of drive wheels 48 in., width 24 in. Pulley: 10½x8½ in., controlled by motor clutch; driven through gears. 2 fuel tanks, 10 and 20 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Pierce governor. Zenith carburetor. Cooling: Own make tube type radiator, pump circulation; Hy-Duty 20-in. fan; fan belt pulleys 8x2⅝ in. and 5x2⅝ in.; flat belt 52x2¼ in. Spark plugs: Splitdorf, ⅞ in. S. A. E. 3 rings to piston, 3-16 in. wide. Lateral hitch adjustment 18 in., vertical 12 in. Tractor dimensions: Length 132 in., width 74 in., height 68 in.; shipping weight 6,000 lbs.

TRENAM TRACTOR CO., STEVENS POINT, WIS.
TRENAM 12-24.



A 3-plow tractor with 2 driving wheels in front and 1 supporting wheel in rear; 12 h. p. on drawbar, 24 h. p. on belt; recommended for 18-in. ensilage cutter with 35-ft. blower; 2 speeds forward, 2½ to 3½ m. p. h. Motor: T head, 4 cylinders vertical, 4¾x6 in., 900 r. p. m.; recommended for kerosene or gasoline. Final drive: Roller chain, open. Drive wheels 60 in. high, 10 in. wide. Pulley: 20x7½ in., 405 r. p. m.; driven through gears; belt speed 2,120 ft. per min. Dixie magneto. Kingston 1¼-in. carburetor. Modine radiator. Tractor dimensions: Length 11 ft. 6¼ in., width 6 ft. 7 in., height 5 ft. 6 in.; weight 4,500 lbs.

TURNER MFG. CO., PORT WASHINGTON, WIS.
TURNER SIMPLICITY 14-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15.68 h. p. on drawbar, 24.48 h. p. on belt; recommended for 28-in. thresher; 3,600 lbs. pull low plowing speed, 2,600 lbs. high; 2 speeds forward, 1¾ and 2½ m. p. h.; diameter turning circle 16 ft.; retail price f.

o. b. factory Jan. 1, 1919, $1,675. Motor: Buda, L head, 4 cylinders vertical, 4¼x5½ in., 1,000 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed; recommend Mobiloil BB for summer and Mobiloil B for winter. Bearings: Front wheels, plain; rear wheels, own make roller; transmission and jackshaft, Hyatt roller; cooling fan, balls. Transmission: Foote-Strite, enclosed gears, finished. Final drive: Bull pinion and gear, open. Height of drive wheels 54 in., width 12 in. Pulley: 14x7½ in., 600 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,200 ft. per min. 2 fuel tanks, 5 and 15 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Duplex Simplex model governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes 20-in. fan; flat belt, 36x1½ in. Spark plugs: Splitdorf, ⅞ in. S. A. E. 3 rings to piston, 4¼x¼ in. Lateral hitch adjustment 27 in. Tractor dimensions: Length 132 in., width 60 in., height 60 in.; shipping weight 4,500 lbs.; 333 cu. ft. packed for export.

U. S. TRACTOR & MACHINERY CO., MENASHA, WIS.
UNCLE SAM 20-30.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 15 h. p. on drawbar, 25 h. p. on belt, S. A. E. rating; recommended for 28-in. thresher; 2,500 lbs. average pull at plowing speed, 3,000 maximum; 1 speed change forward, 2½ m. p. h.; diameter turning circle 27 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,300. Motor: Beaver J. B., valve in head, 4 cylinders vertical, 4¾x6 in., 900 r. p. m.; fuel recommended, kerosene. Lubrication: Internal force feed. Timken roller bearings throughout, except Hyatt roller or cup and cone for cooling fan. Transmission: Nuttall enclosed gear, finished. Final drive: Spur gear to live axle, enclosed. Height of drive wheels 50 in., width 12 in. Pulley: 11x8 in., 900 r. p. m.; controlled by motor clutch and jaw clutch; driven through gears; belt speed 2,600 ft. per min. 2 compartment fuel tank, 3 and 22 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Duplex governor. Bennett 1½-in carburetor. Cooling: Perfex radiator, pump circulation; Oakes or Hy-Duty 22-in. fan; fan belt pulleys, drive 7¾x1¾ in., driven 3½x1¾ in.; flat belt, 34x1⅝ in. Spark plugs: Champion, ⅞ in. S. A. E. 4 rings to piston, ¼x4¾ in. Lateral hitch adjustment 12 in., vertical 4 in. Tractor dimensions: Length 133 in., width 76 in., height 72 in.; shipping weight, boxed for export, 5,500 lbs., 368 cu. ft.

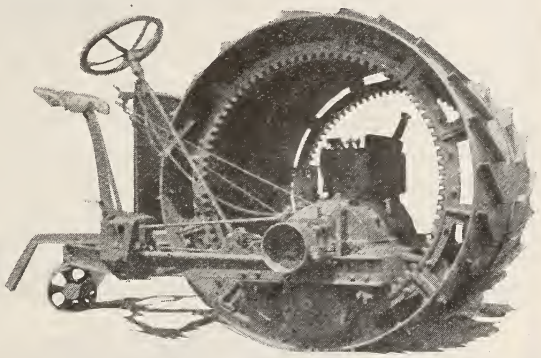
UNITED TRACTORS CO., INC., NEW YORK, N. Y.
CULTITRACTOR.

A 1-plow 2-wheel tractor and motor cultivator; 8 h. p. on drawbar, 15 h. p. on belt; recommended for 18-in. thresher; 1,000 lbs. pull at plowing speed; 1 speed change forward, 1½ to 3 m. p. h.; diameter turning circle 10 ft. Motor: Light, L head, 4 cylinders vertical, 3¼x4½ in., 500 to 1,200 r. p. m.; fuel recommended, gasoline and kerosene. Circulating splash lubrication. Bearings: Timken roller throughout. Transmission: Own make, enclosed gears, cut and hardened. Live axle drive. Height of wheels 40 in., width 8 in. Pulley: 8x4 in., 600 r. p. m., controlled by independent friction clutch, driven through gears; belt speed 1,260 ft. per min. 2 fuel tanks, 1 and 6 gals. Bennett centrifugal air cleaner. Sims high tension magneto, no impulse starter. Own governor. Kingston ⅞-in. carburetor. Cooling: Rex radiator, thermo-syphon circulation; 16-in. fan; fan belt pulleys, 2x1 in.; flat belt, 30 in. long and 1 in. wide. Spark plugs, ⅞ in. S. A. E. 3 rings to piston, 3¼x¼ in. Tractor dimensions: Length 144 in., width 42 to 58 in., height 54 in.; shipping weight 2,200 lbs.; 105 cu. ft. packed for export. Distributors: J. S. Woodhouse Co., 191 Water St., New York City, for southern New York, northern New Jersey and Connecticut; Quaker City Corp., 126 S. Front St., Philadelphia, Pa., foreign.

VELIE MOTORS CORP., MOLINE, ILL.
VELIE BILTWEL 12-24.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 24 h. p. on belt, S. A. E. rating; 3 speeds forward, 2, 2.9 and 6.5 m. p. h.; 18 ft. turning circle. Motor: Own, 4 cylinders vertical, 4⅛x5½ in., 1,100 r. p. m.; recommended for kerosene. Force feed lubrication. Hyatt and Timken roller bearings throughout. Transmission: Enclosed nickel steel gears, cut and heat treated. Final drive: Enclosed bull pinions and gears, cut and hardened. Drive wheels 52 in. high, 10 in. wide. Pulley: 13x7½ in., 900 r. p. m.; driven through gears; belt speed 3,060 ft. per min. High tension magneto. Pierce governor. Kingston carburetor in combination with kerosene generator. Cooling: Tubular radiator, spring supported, pump circulation; water capacity 12 gals.; 19-in. fan. Tractor dimensions: Length 11 ft. 6 in., width 5 ft. 6 in.; weight with fuel and water 4,500 lbs.

VICTOR TRACTOR CO., MINNEAPOLIS.
VICTOR.



A 4-plow tractor with 2 drum wheels, motor inside; 4,500 lbs. pull at plowing speed; 2 speeds forward, 2⅝ and 4½ m. p. h.; diameter turning circle 96 in.; retail price f. o. b. factory Jan. 1, 1919, $1,685. Motor: Climax, L head, 4 cylinders vertical, 5x6½ in., 900 r. p. m.; fuel recommended, kerosene. Internal force feed lubrication. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gear, open. Height of drum wheels 62½ in., width 24 in. Pulley: 10x8 in., 900 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 2,340 ft. per min. 2 fuel tanks, 5 and 30 gals. Bennett centrifugal air cleaner. K-W high tension magneto with impulse starter. Climax governor. Stromberg carburetor. Cooling: S-J radiator, pump circulation; Spartan 20-in. fan; fan belt pulleys 3x2½ in.; flat belt 31 in. long and 2½ in. wide. Lateral hitch adjustment 36 in., vertical 12 in. Tractor dimensions: Length 112 in., width 68 in., height 62½ in.; shipping weight 4,300 lbs.; 215 cu. ft. packed for export.

VICTORY TRACTOR CO., GREENSBURG, IND.
VICTORY 9-18.

A 2-plow tractor with 2 drive wheels and 1 steering wheel; 11 h. p. on drawbar, 19 h. p. on belt; recommended for 20-in. thresher; 2,000 lbs. pull at plowing speed; 2 speeds forward, 1.9 to 2.5 and 3 to 4.5 m. p. h.; diameter turning circle 15½ ft.; retail price f. o. b. factory Jan. 1, 1919, $1,085. Motor: Gray, valve in head, 4 cylinders vertical 3½x5 in., 1,175 r. p. m.; fuel recom-

Waterloo Boy

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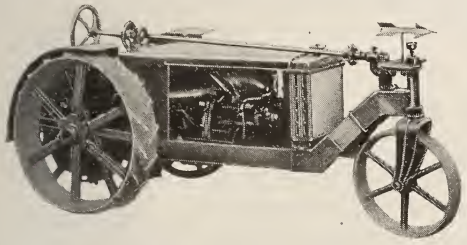
Remember that in tractor merchandising there is nothing better than the exclusive sales rights in your territory to a **good** tractor backed by a **permanent** organization. With a good tractor to sell you have a solid foundation for a good tractor business. With a permanent organization back of the tractor, you have a sure future for the business that you build.

Because it had proved itself to be a success and not an experiment, the Waterloo Boy Kerosene Burning Tractor became a member of the John Deere family. It is the tractor with an established reputation for reliable, economical operation—the tractor backed by a permanent organization with a long established reputation for highly satisfactory relations with dealers.

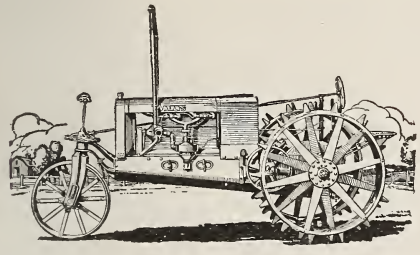
JOHN DEERE **MOLINE, ILLINOIS**

mended, gasoline. Lubrication: Circulating splash and force feed; oil recommended, medium heavy in summer and medium in winter. Bearings: Front wheels and cooling fan, Hyatt roller; rear wheels, rear axle, transmission and jackshaft, annular ball. Transmission: Own make, enclosed gears, finished and hardened. Final drive: Worm and internal gear. Height of drive wheels 48 in., width 12 in. Pulley: 9x6 in., 1,175 r. p. m.; con-



trolled by motor clutch; driven through gears; belt speed 2,600 ft. per min. 1 fuel tank, 25 gals. Orem felt strainer air cleaner. Dixie magneto with impulse starter. Pierce governor. Carter 1-in. carburetor. Cooling: Jamestown radiator, thermo-syphon circulation; Hy-Duty 20-in. fan; fan belt pulleys, 1⅝ in. wide, 4½ and 2½ in. diameter; flat belt, 34x1½ in. Spark plugs: Bethlehem, ⅞ in. S. A. E. 3 rings to piston, ¼x3½ in. Lateral hitch adjustment 32 in., vertical 4 in.

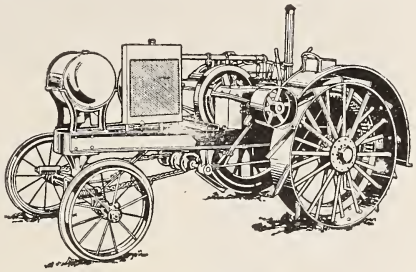
WALLIS TRACTOR CO., RACINE, WIS.
WALLIS.



A 3-plow tractor with 2 drive wheels and 1 steering wheel; 13⅓ h. p. constant, 17⅓ h. p. maximum at drawbar, 25 h. p. at belt; 2,000 lbs. pull constant, 2,600 lbs. maximum; recommended for 24 to 26-in. thresher; 2 speeds forward, 2½ to 3½ m. p. h.; 20 ft. turning circle. Motor: Own, valve in head, 4 cylinders vertical with removable sleeves, 4¼x5¾ in., 900 r. p. m.; recommended for gasoline; kerosene equipment optional. Circulating splash lubrication. Hyatt roller bearings throughout, including front wheel. Transmission: Enclosed forged gears, cut and heat treated. Final drive: Enclosed double gears and pinions direct to live axle. Drive wheels 48 in. high, 12 in. wide. Pulley: 18x6 in., 430 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,020 ft. per min. Fuel capacity 20 gals. Equipped with air cleaner. K-W magneto with impulse starter. Hydraulic governor. Bennett 1¼-in. carburetor. Cooling: Modine Spirex radiator, pump circulation, belt driven fan. Hitch adjustable from 13½ to 17 in. high. Tractor dimensions: Length 148 in., width 61 in.; shipping weight 3,525 lbs. Distributors: J. I. Case Plow Works, Racine, Wis., and branches.

WATERLOO GASOLINE ENGINE CO., WATERLOO, IA.
WATERLOO BOY 12-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; recommended for 24-in. thresher; 2,400 lbs. pull at plowing speed; 2 speeds forward, 2⅛ and 3 m. p. h.; diameter turning circle 24 ft. Motor: Own make, valve in head, 2 cylinders twin horizontal, 6½x7 in., 750 r. p. m.; fuel recommended, kerosene. Own make mechanical lubricator and splash. Bearings: Front wheels, plain; rear axle, transmission, jackshaft and cooling fan, Hyatt roller. Transmission: Own make, enclosed gears, finished and hardened. Final drive: Bull pinions and gears, shielded. Height of drive wheels 52 in., width 12 in. Pulley: 14x8 in., 750 r. p. m.; controlled by motor



clutch; mounted on crankshaft; belt speed 2,750 ft. per min. 2 fuel tanks, 1 and 20 gals. Periscope air intake. Dixie magneto with impulse starter. Own make governor. Schebler model D 1½-in. carburetor. Cooling: Modine radiator, centrifugal pump circulation; Oakes or Hy-Duty 20-in. fan; fan belt pulleys, 4x⅞ in.; V belt, 100 in. long, ¾x⅞ and ⅞x½ in. maximum widths; angle of V pulleys, 22½ degrees. Mica ½-in. spark plugs. 4 rings to pistons, 6 19-32x5-16 in. Lateral hitch adjustment 36 in., vertical 6 in. Tractor dimensions: Length 136 in., width 72 in., height 66 in.; shipping weight 6,000 lbs.; packed for export, 11 ft. 6 in.x6 ft. 6 in.x4 ft. 6 in., 236½ cu. ft. Distributors: Deere & Co. branches.

H. A. WETMORE, SIOUX CITY, IA.
WETMORE 12-25.

A 2-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 24.8 h. p. on belt; recommended for 20 to 24-in. thresher; 3 speeds forward, 1.9, 2¾ and 4¾ m. p. h.; diameter turning circle, inside of 19 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,385. Motor: Rutenbur, L head, 4 cylinders vertical, 4⅛x5½ in., 960 r. p. m.; fuel recommended, gasoline. Internal force feed lubrication; oil recommended, Monogram heavy or Mobiloil A in summer and Polarine medium in winter. Bearings: Front wheels, plain; rear wheels and rear axle, Timken roller; transmission, annular ball; cooling fan, cup and cone ball. Transmission: Fuller sliding gears, enclosed, finished. Final drive: Torbensen internal pinion and gear, enclosed. Height of drive wheels 46 in., width 10 in. Pulley: 12x7 in., 750 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,370 ft. per min. 1 fuel tank, 12 gals. Dixie magneto with impulse starter. Pierce governor. Kingston 1¼-in. carburetor. Cooling: Ideal radiator, pump circulation; Rutenbur 18-in. fan; fan belt pulleys, 4 in. drive, 2½ in. driven; flat belt, 1½ in. wide. Spark plugs, ⅞ in. Hitch:

Lateral adjustment 12 in. Tractor dimensions: Length 110 in., width 63 in., height 66 in.; shipping weight 2,900 lbs.

WICHITA TRACTOR CO., WICHITA, KAN.
WICHITA.

A 2 to 3-plow tractor with 2 drive wheels and 2 steering wheels; 8 h. p. on drawbar, 16 h. p. on belt; 1,500 lbs. pull at 2¼ m. p. h.; 1 speed change forward, 2¼ m. p. h.; diameter turning circle 20 ft.; retail price f. o. b. factory Jan. 1, 1919, $1,170. Motor: Gile, L head, 2 cylinders opposed, 5½x6 in., 750 r. p. m.; fuel recommended, gasoline. Madison-Kipp lubricator. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gear, open. Height of drive wheels, 56 in., width 10 in. Pulley: 12x6 in., 750 r. p. m.; controlled by motor clutch, mounted on extension of crankshaft; belt speed 2,358 ft. per min. 1 fuel tank, 9 gals. Bennett centrifugal air cleaner. Atwater-Kent ignition. Gile governor. Kingston 1¼-in. carburetor. Cooling: Perfex radiator, pump circulation; Oakes 18-in. fan. Tractor dimensions: Length 128 in., width 70 in., height 61 in.; shipping weight 3,500 lbs. Distributor: Farm Tractor Sales Co., Kansas City, Mo.

WILSON TRACTOR CO., PEORIA, ILL.
WILSON 6-12.

A 2-row motor cultivator with 2 drive wheels and 1 supporting wheel; 6 h. p. on drawbar, 12 h. p. on belt; speeds forward, 1 to 3¾ m. p. h.; diameter turning circle 15 ft. 10 in. Motor: Le Roi, L head, 4 cylinders vertical, 3⅛x4½ in., 950 r. p. m.; fuel recommended, gasoline. Lubrication: Circulating splash; oil recommended, Mobiloil A. Bearings: Front and rear wheels and jackshaft, Hyatt rollers; transmission, Hyatt and SKF; cooling fan, balls. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gear, open, with guard over lower half. Height of drive wheels 44 in., width 6 in. Pulley: 6½x6 in., 950 r. p. m.; controlled by motor clutch; mounted on crankshaft; belt speed 1,600 ft. per min. 1 fuel tank, 10 gals. Own make air cleaner, water type. Eisemann magneto. Le Roi governor. Kingston ⅞-in. carburetor. Cooling: Own radiator (flat tube), thermo-syphon circulation; Oakes 13-in. fan; fan belt pulleys 6½x1¼ in.; flat belt 65x1⅛ in. Champion spark plugs, ⅞ in. S. A. E. 3 rings to piston, 3⅛x¼ in. Lateral hitch adjustment 6 in., vertical 4 in. Tractor dimensions: Length 161 in., width 105 in., height 65 in.; shipping weight 2,800 lbs. Distributor: Parrett Machine Co., Peoria, Ill., for Illinois.

WISCONSIN FARM TRACTOR CO., SAUK CITY, WIS.
WISCONSIN 16-32.

A 3 or 4-plow tractor with 2 drive wheels and 2 steering wheels; 16 h. p. on drawbar, 32 h. p. on belt; recommended for 28-in. thresher; 3,500 lbs. pull at plowing speed; 2 speeds forward, 2⅓ and 3½ m. p. h.; diameter turning circle 22 ft.; retail price f. o. b. factory Jan. 1, 1919, $2,250. Motor: Climax, L head, 4 cylinders vertical, 5x6½ in., 800 r. p. m.; fuel recommended, kerosene. Internal force feed lubrication. Bearings: Front and rear wheels and rear axle, plain; transmission, Hyatt and Timken roller; jackshaft, Hyatt roller; cooling fan, balls. Transmission: Foote, enclosed gears, finished. Final drive: Bull pinion and gears, open. Height of drive wheels 52 in., width 12 in. Pulley: 16x8 in., 575 r. p. m.; controlled by motor clutch; driven through gears; belt speed 2,400 ft. per min. 2 fuel tanks, 11 and 6 gals. Bennett centrifugal air cleaner. Eisemann magneto with impulse starter. Climax governor. Stromberg 1½-in. carburetor. Cooling: Perfex radiator, pump circulation. Oakes 22-in. fan; fan belt pulleys, 8x2¼ in. and 3x2¼ in.; flat belt, 46 in. long and 2 in. wide. Champion spark plugs, ⅞ in. S. A. E. 3 rings to piston, 5x¼ in. Lateral hitch adjustment 24 in. Tractor dimensions: Length 135 in., width 66 in., height 67 in.; shipping weight 5,400 lbs.; 290 cu. ft. packed for export.

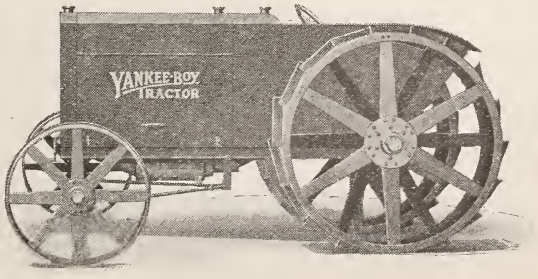
WOLVERINE TRACTOR CO., SAGINAW, MICH.
WOLVERINE 41.

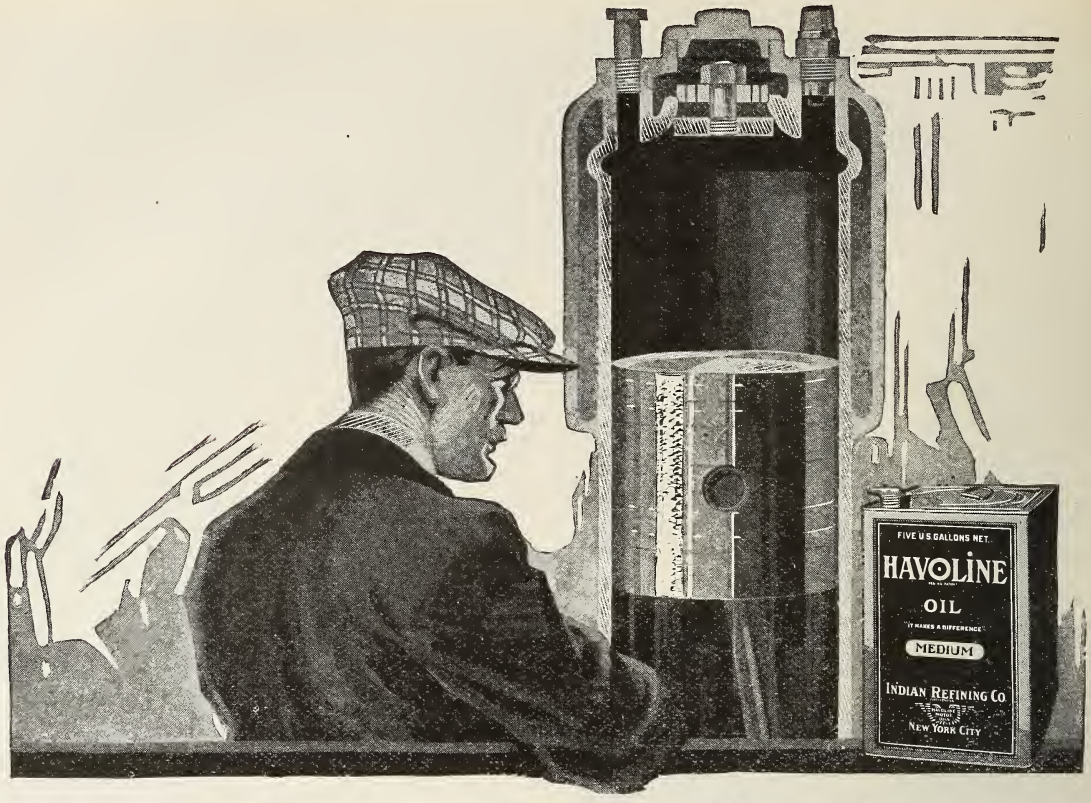
A 4-plow tractor with 1 driving track in center rear, 2 small driving wheels and stabilizers in rear, and 2 steering wheels in front; 41 h. p. at 900 r. p. m.; 1 speed forward, 2½ m. p. h. Motor: Valve in head, 4 cylinders vertical, 4¾x6½ in., 900 r. p. m.; recommended for kerosene. Splash lubrication. Bearings: 28 Timken rollers, 1 Hyatt roller and 2 annular balls. Transmission: Enclosed stub tooth gears, cut and hardened. Final drive: Direct to driving axle. Crawler 5 ft. long on ground, 18 in. wide; all 4 wheels 27 in. high, 12 in. wide. Pulley: 14x8 in., 900 r. p. m.; driven through bevels from front of motor, and detachable; belt speed 3,295 ft. per min. Bennett centrifugal air cleaner. Dixie magneto. Radiator mounted back of motor, pump circulation; 20-in. Oakes fan. 3 ¼-in. rings to pistons. Equipped with storage battery and two lamps.

WORLD HARVESTER CORP., NEW YORK, N. Y.
AUTO-TILLER.

A garden or cultivating tractor, operator walking behind, with power sufficient for one 10 to 12-in. bottom; 10 h. p. at 800 r. p. m.; 850 lbs. pull at drawbar; 1 speed forward, 2½ m. p. h. Motor: 1 cylinder vertical, L head, 4 cycle, 5x7 in., 800 r. p. m.; recommended for kerosene or gasoline. Transmission and drive: Worm, with clutch to wheels. Drive wheels 36 in. high, 5 in. wide. Equipped with power pulley. Atwater-Kent or magneto ignition. Stromberg 1¼-in. carburetor. Cooling: Honeycomb radiator, pump circulation. Tractor dimensions: Length, including rear truck and handles, 108 in., width 39 in., height 48 in.; approximate weight 950 lbs.

YANKEE BOY TRACTOR CORP., CHICAGO.
YANKEE BOY 16-32.





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HAVOLINE "A"—Where a lighter oil than Havoline "K" is required. Especially fine for passenger cars and motor trucks.

INDIAN REFINING COMPANY

244 MADISON AVENUE **NEW YORK, N. Y.**

A 3 to 4-plow tractor with 2 drive wheels and 2 steering wheels; 22 h. p. on drawbar, 40 h. p. on belt; recommended for 32-in. thresher; 3,500 lbs. pull at plowing speed; 2 speeds forward, 2½ and 3½ m. p. h.; diameter turning circle 96 in.; retail price f. o. b. factory Jan. 1, 1919, $2,295. Motor: Climax, L head, 4 cylinders vertical, 5x6½ in., 800 r. p. m.; fuel recommended, kerosene. Circulating splash and force feed lubrication. Bearings: Front and rear wheels and rear axle, plain; transmission and jackshaft, Hyatt roller. Transmission: Foote, enclosed gears, finished. Live axle drive. Height of drive wheels 54 in., width 12 in. Pulley: 16x8 in., controlled by motor clutch; driven through gears; belt speed 2,100 ft. per min. 2 fuel tanks, 5 and 20 gals. Bennett centrifugal air cleaner. Dixie magneto with impulse starter. Own governor. Stromberg 1½-in. carburetor. Cooling: Perfex radiator, pump circulation; Climax 22-in. fan; flat belt. Champion spark plugs, ⅞ in. 3 rings to piston, 5x¼ in. Lateral hitch adjustment 24 in., vertical 17 in. Tractor dimensions: Length 132 in., width 72 in., height 68 in.; shipping weight 5,400 lbs.; 172 cu. ft. packed for export.

YUBA MFG. CO., MARYSVILLE, CAL.
YUBA BALL TREAD 12-20.

A tractor with 2 track layers and 1 front supporting wheel; 12 h. p. on drawbar, 20 h. p. on belt; 3,400 lbs. pull at plowing speed; 3 speeds forward, 1.5, 2 and 4 m. p. h.; diameter of turning circle 108 in. Motor: Waukesha, Model "M," L head, 4 cylinders vertical, 4½x6¾ in., 700 r. p. m.; fuel recommended, distillate. Internal force feed lubrication; heavy oil in summer and medium in winter. Bearings: Front wheel, babbitt; rear wheels, rear axle, transmission and jackshaft, Hyatt roller; cooling fan, Hess-Bright annular balls. Transmission: Own, enclosed gears, finished. Final drive: Bull pinion and gear, enclosed. Length of tracklayers on ground 36 in., width 13 in. Pulley: 12x6¾ in., 700 r. p. m.; controlled by motor clutch; mounted on drive shaft back of transmission case; belt speed 2,195 ft. per min. 2 fuel tanks, 1 quart and 27 gals. Donaldson dry air cleaner. Bosch DU4 magneto, no impulse starter. Waukesha governor. Ensign 1¼-in. carburetor. Cooling: Own radiator, pump circulation; Hotz cast aluminum 22-in. fan; fan belt pulleys, 8 and 3½x2 in.; flat belt, 37 in. long and 2 in. wide. Splitdorf spark plugs, ⅞ in. S. A. E. 3 rings to piston, 4½x¼ in. Lateral hitch adjustment 10 in. swing. Tractor dimensions: Length 149 in., width 55 in., height 55 in. without canopy, 91 in. with canopy; shipping weight 6,750 lbs.; packed for export, 155x60x65 in. Distributors: A. F. George Co., Inc., Los Angeles and Fresno, Cal.; Pengilly & Clarke Co., Stockton, Cal.; San Jose Tractor & Truck Co., San Jose, Cal.; Inland Truck & Tractor Co., Walla Walla, Wash.; Young Hardware Co., Napa, Cal.; Booth Bros., Paso Robles, Cal.; Ketterlin Bros., Santa Rosa, Cal.; Henry Spring Co., Sacramento, Cal.

YUBA MFG. CO., MARYSVILLE, CAL.
YUBA BALL TREAD 20-35.

A tractor with 2 tracklayers and 1 front supporting wheel; 20 h. p. on drawbar, 35 h. p. on belt; 5,000 lbs. pull at plowing speed; 2 speeds forward, 2.08 and 3.28 m. p. h.; turning radius 110 in. Motor: Wisconsin model D, T head, 4 cylinders vertical, 5¼x7 in., 700 r. p. m.; fuel recommended, distillate. Internal force feed lubrication, extra heavy oil in summer and heavy or medium in winter. Bearings: Front wheel, babbitt; rear wheels, rear axle, transmission and jackshaft, Hyatt roller; cooling fan, Hess-Bright annular ball. Transmission: Yuba, enclosed gears, finished. Final drive: Bull pinion and gear, open. Length of tracklayers on ground 40 in., width 18 in. Pulley: Diameter 10, 12 or 14 in., as desired; face 8½ in., 700 r. p. m.; controlled by Lemley clutch pulley driven through gears; belt speeds, 10-in. pulley 1,835 ft. per min., 12-in. pulley 2,195 ft. per min., 14-in. pulley 2,565 ft. per min. 2 compartment fuel tank, 8 and 30 gals. Donaldson dry air cleaner. Bosch DU4 magneto, no impulse starter. No governor. Stromberg M3 1½-in. carburetor. Cooling: Yuba C. I. shell flat tube radiator, pump circulation; Hotz 24-in. cast aluminum fan; fan belt pulleys, 8 in. driver, 3½ in. driven, 2-in. face; flat belt, 43¾ in. long and 2 in. wide. Splitdorf ½-in. spark plugs. 4 rings to piston, 5¼x¼ in. Lateral hitch adjustment, 14 in., vertical 8 in. Tractor dimensions: Length 185 in., width 73½ in., height 61 in. without canopy, 84 in. with canopy; shipping weight 10,250 lbs.; packed for export, 170x80x70 in.

ZELLE TRACTOR CO., ST. LOUIS. MO.
ZELLE 12-25.

A 3-plow tractor with 2 drive wheels and 2 steering wheels; 12 h. p. on drawbar, 25 h. p. on belt; recommended for 24-in. thresher; 2,000 lbs. pull at plowing speed; 4 speeds forward, 1¼, 2½, 3¾ and 5 m. p. h.; diameter turning circle 8½ ft. Motor: Valve in head, 4 cylinders vertical, 4¼x5½ in., 900 r. p. m.; fuel recommended, kerosene. Circulating splash and internal force feed lubrication. Bearings: Wheels, rear axle and jackshaft, roller; transmission, ball and roller; cooling fan, ball. Transmission: Own make, enclosed gears, finished. Final drive: Bull pinion and gear, enclosed. Height of drive wheels 54 in., width 12 in. Pulley: 12x7 in., 600 r. p. m.; controlled by independent friction clutch; driven through gears; belt speed 2,000 ft. per min. 2 fuel tanks, 5 and 25 gals. Magneto ignition with impulse starter. 1¼-in. carburetor. 4 rings to piston, 4¼x¼ in. Lateral hitch adjustment 12 in., vertical 24 in. Tractor dimensions: Length 137 in., width 65 in., height 71 in.; shipping weight 4,000 lbs.; 450 cu. ft. packed for export.

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P & O Little Genius—The Ideal plow for the one-man outfit. Power Lift. IXL Bottoms with Quick Detachable Shares. Single trip rope control. Made in 2 and 3-furrow with 12 or 14-inch bottoms, and 4-furrow with 14-inch bottoms.

P & O Moguls—The plow for large farms and ranches. 4, 5, 6, 8 and 10-furrow sizes. 14-inch bottoms. Power Lift with independent lever lift. IXL Bottoms with Quick Detachable Shares.

P & O Tractor Disc Plows—Same lift as used on famous P & O Little Genius. Many new features. Made in 3 and 4-furrow with 24 or 26-inch discs. This is one successful tractor disc plow.

P & O Grub Breaker—For breaking grub, brush and mesquite land. Weighs a ton. Cuts a furrow 12 inches deep and 24 inches wide. Built to stand any strain.

P & O Tractor Harrow—Once over with a P & O Tractor Tandem Disc Harrow beats twice over with an ordinary harrow. Made in 8 and 10-foot sizes, with 16 or 18-inch discs. Built extra strong. Flexible frame insures perfect work in rough ground.

P & O Power Lift Lister—Little Genius Power Lift. Plows and plants two rows at a time. Just what the western farmer has been looking for. We have always led in the building of listers and here is a worthy member of the line.

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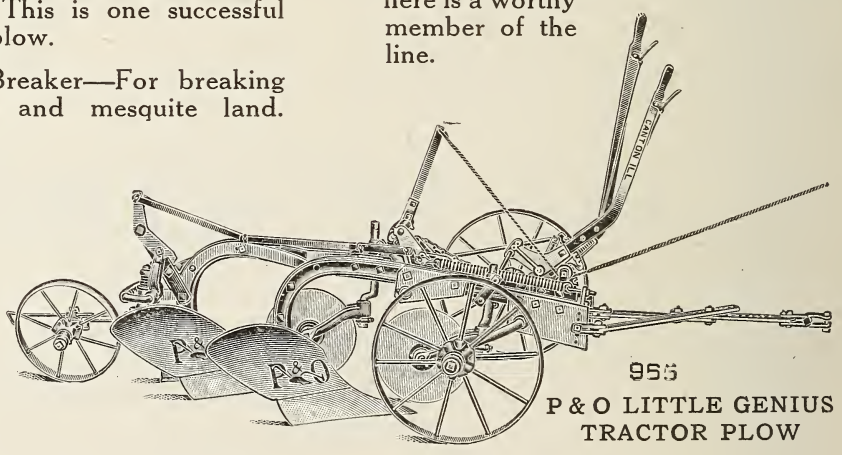

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TRACTOR PLOW ADJUSTMENTS AND HITCHES

BY C. O. REED.

There are two common types of engine gangs now on the market—the flexible beam type, shown in Fig. 1, in which each plow can be raised independent of the others, and the rigid beam type, shown in Fig. 2, in which all the plow bottoms are yoked rigidly together to be raised or lowered as a unit. Gangs of the former type are known as "free lift" plows to many farmers, while those of the latter class are often called "unit gangs." The distinction should be gotten clearly in mind for these terms will be used frequently throughout these discussions.

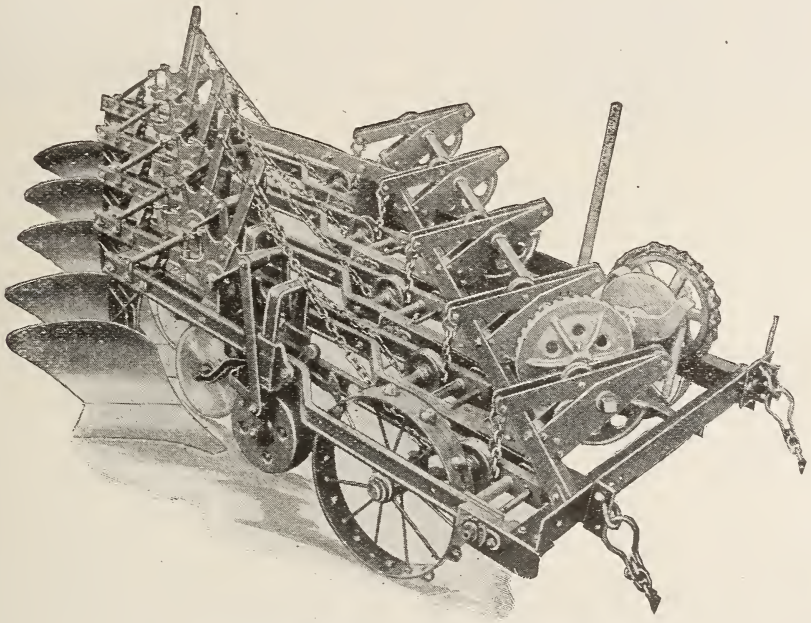


Fig. 1—Flexible Frame, or "Free Lift" Tractor Gang.

Assembling.

Of the two types, the rigid beam gangs are much the simpler, and little difficulty will be encountered in setting up a plow of this kind. Before allowing the implement to leave the store, however, it is well to place about a 6-inch block under the land wheel to make sure the frame can be leveled when the plows are lowered to working depth. This is a valuable precaution for the beginner to take. It is very easy to reverse links or attach castings in such a way that the frame cannot be leveled or the bottoms cannot be lowered freely when an attempt is made to use the implement.

Assembling a flexible beam plow is more of a task, for each bottom must be attached to the frame separately, and the proper width, suck and wing secured for each base. A good method of procedure is as follows:

Assemble the frame and land wheels on a smooth clean floor and place under each land wheel a block which is as high as the furrow is to be deep. Then attach either outside bottom and carefully align it parallel to one land wheel or at right angles to the front crossbeam of the frame. Attach the next bottom, securing the proper width of cut by measuring along the floor perpendicularly between the faces of the landsides. Then adjust the spacing blocks between the two sets of beams so that they will work snugly together.

After all of the plows have been attached and properly spaced, adjust each bottom for suck. The heels of the landside on most makes of breaker bottoms should be run flat, that is, the heels should just touch the floor; on most old ground plows, however, the heels of the landsides should be raised about half an inch. After the proper suck has been obtained adjust each bottom for "wing." The wing of the share should cut to the same depth as the throat. If it becomes necessary to raise or lower the wing of any bottom to bring it into proper position, it will probably be necessary to readjust the spacing blocks. Too much emphasis cannot be placed upon the importance of careful adjustment in setting up. The cause for uneven furrow crowns, poor scouring and heavy draft may often be traced to careless assembling.

Hitches and Sidedraft.

The true line of pull in a double drive wheel trac-

tor may be considered to pass midway between the drivers as shown in Fig. 3. If the load cannot be attached to the engine over this true line of pull it is a well-known fact that sidedraft will result in the motor, some of the engine's power will be lost, uneven wear in the gears may result, and the front wheels of the engine will tend to slide toward the plowed ground.

For all practical purposes the true line of draft of a small engine gang containing an odd number of bottoms may be considered to pass through the center of the middle beam. On a small gang containing an even number of plows, the true line of draft may be considered to pass midway between the two middle beams, as shown in Fig. 3. It is also a well-known fact that if the power cannot be applied to the gang over its true line of draft, sidedraft will result in the plow and some trouble may

At the beginning of the second bout around the new land, place the engine as near the open furrow as it is safe to run it, and carefully arrange the gang in its proper relation to the furrow. With a nail scratch two marks on the draw-bar of the engine—one mark to show the position of the true line of pull of the tractor, and the other to indicate where the true line of draft of the plow would cut the draw-bar if extended ahead. Then attach the chains in such a way that the cross in the chains is behind a point on the draw-bar midway between the nail marks, about as shown in Fig. 3. If the crotch chain or bar hitch is used, bring the point of attachment to the draw-bar about midway between the marks. If sidedraft appears objectionable in the engine when the outfit is started, throw more of the sidedraft into the plow by moving the chains to the left on the draw-bar and by lengthening

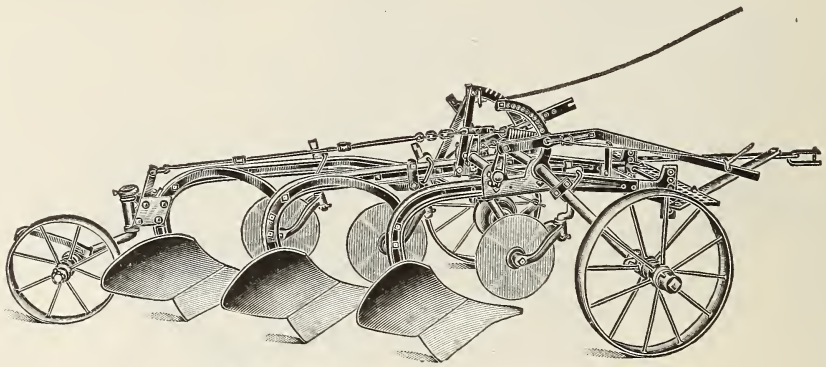


Fig. 2—Rigid Frame, or "Unit Lift" Tractor Gang.

be experienced with heavy draft, furrow bank breaking, poor covering and failure to scour.

An ideal working condition, then, should allow the true line of pull of the engine to coincide with the true line of draft of the plow. In most outfits, however, the same condition is to be met which was imposed upon us in the horse gangs—namely, that the power unit is much wider than the plow and each implement must be run in a certain definite relation to the open furrow. The true line of pull then cannot be brought over the true line of draft in many outfits and thus sidedraft is bound to occur somewhere.

Many engine experts advise hitching to the draw-bar over the true line of pull and thereby throwing all of the sidedraft into the plow. At the same time the plow expert may advise hitching to the engine well over to one side of the draw-bar so that most of the sidedraft will be thrown into the engine. All that is left for the unprejudiced dealer to do—and he should be unprejudiced—is to divide up the sidedraft between the two implements by hitching between the line of pull and line of draft as shown in Fig. 3. The description of a good method of procedure follows:

chain R (right) shown in Fig. 3. This adjustment will bring the point of attachment on the draw-bar nearer the true line of pull. If sidedraft exists in the plow to an objectionable degree, move the chains to the right on the draw-bar and lengthen chain L (left), thus throwing more of the sidedraft into the engine by applying the power nearer the true line of draft.

The same effect might be produced by shortening instead of lengthening chains R and L, but inasmuch as many operators are inclined to hitch too close, it is advisable to suggest lengthening only.

The habit of using a very short hitch, with the erroneous idea that it always lessons draft, is dangerous practice. In the first place, sidedraft is usually more noticeable when short hitches are used. This explains to some degree why sidedraft is often less troublesome with those tractors which carry swinging draw-rods, and inference is to be drawn at once that if objectionable sidedraft exists in both the engine and plow, some relief may be had by simply lengthening the hitch. In the second place, if the plow pulls down upon the draw-bar, a short hitch will increase the tendency of the front wheels of the engine to slip toward the open fur-

row. It is an established rule among many plow experts that the short chain should be at least 3½ feet long. A couple of feet of extra chain will not make turning at the ends difficult if wide enough headlands have been left. It is true, however, that

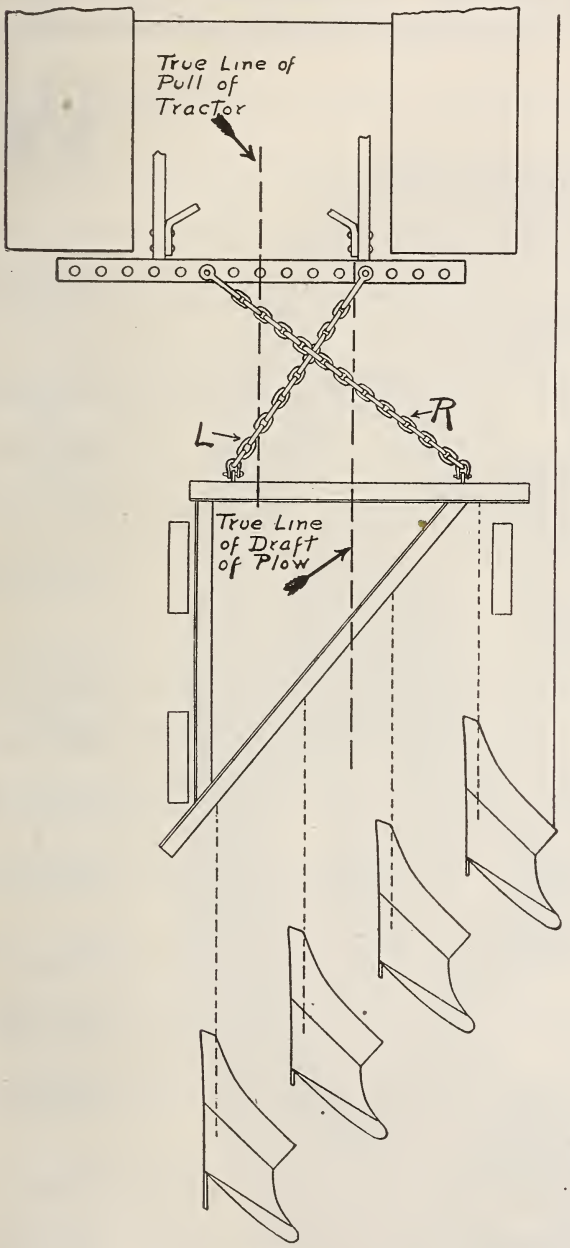


Fig. 3.

the long hitch has its disadvantages if the system is followed of plowing around the field from the outside towards the center.

In making adjustments to shift sidedraft great care must be exercised not to destroy the proper width of cut of the front bottom. Referring again to Fig. 3, if the front plow is cutting too wide the whole gang can be forced toward the plowed ground by moving the chains to the right on the draw-bar or by lengthening chain R. Conversely, by moving the chains to the left on the draw-bar, or by lengthening chain L, the front plow can be made to cut wider.

Hitch adjustments to shift sidedraft can easily be

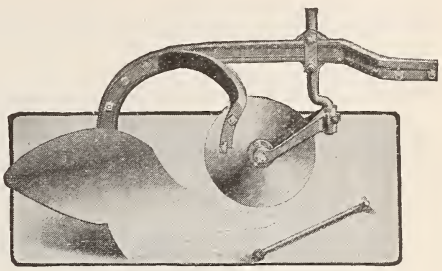


Fig. 4—Proper Set of Coulter.

distinguished from those which affect only the width of cut if the operator will remember the follcwing: Two chain adjustments are necessary to affect sidedraft only—namely, moving both chains to the right or to the left on the draw-bar, and changing the length of one chain; whereas one hitch adjustment is usually all that is necessary to affect

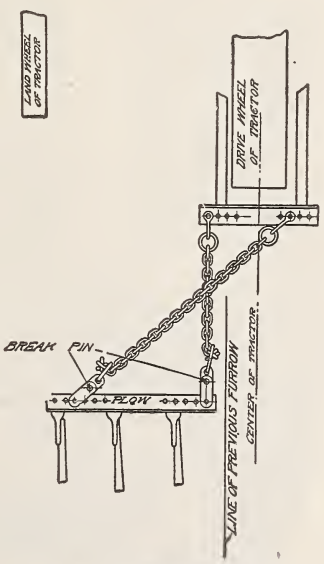
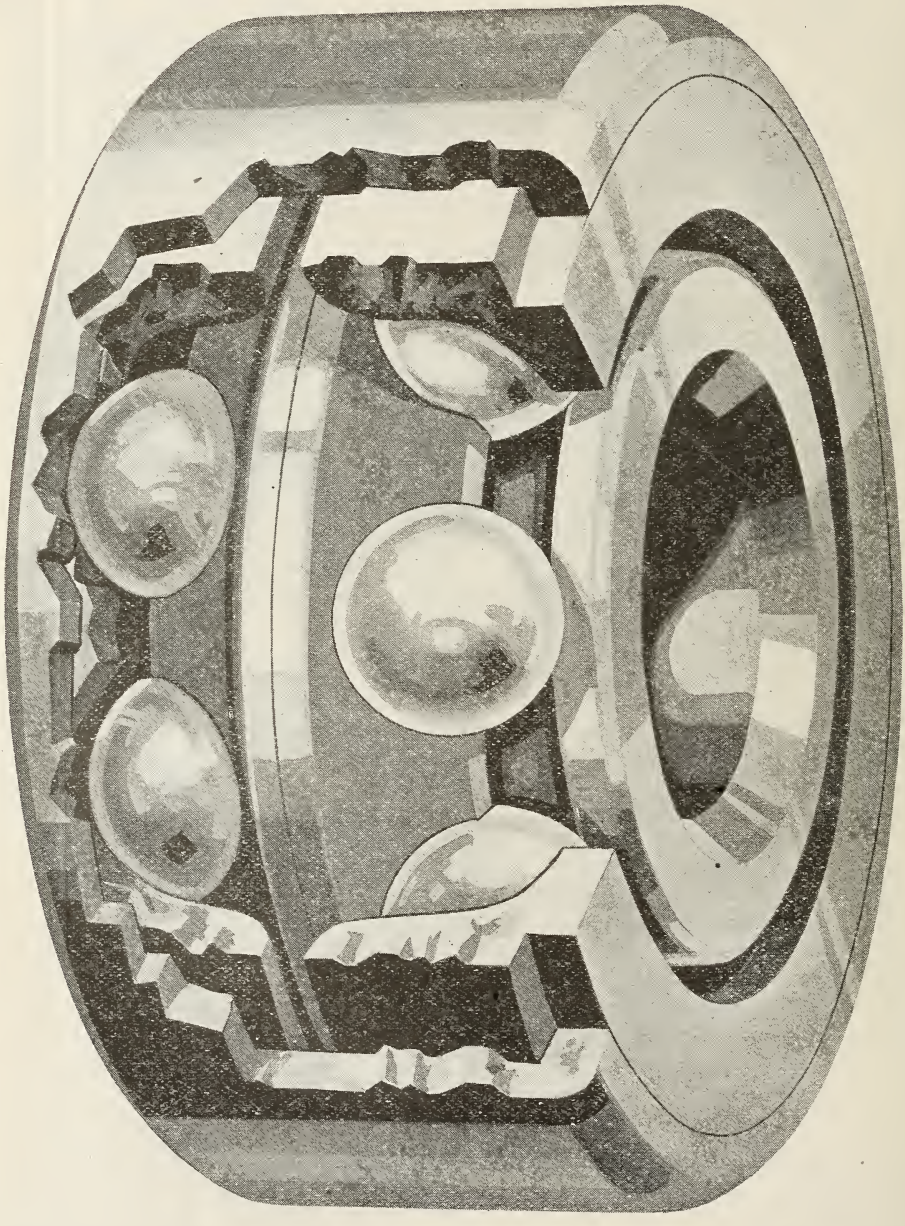


Fig. 5—Cross Chain Hitch.

the width of cut—namely, moving both chains on the draw-bar or changing the length of one.

The effect of chain adjustments can be easily predetermined by remembering the simple fact that an engine gang cannot be dragged through the soil sidewise, and hence, in spite of the side pull at the bridle, the front cross beam of the plow frame tends to keep parallel to the draw-bar of the engine. It

NEW DEPARTUR



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is very easy, then, to picture whether the plow will shift further to the right or to the left in squaring up after a chain has been lengthened. If it seems difficult for a farmer to understand the cross chain

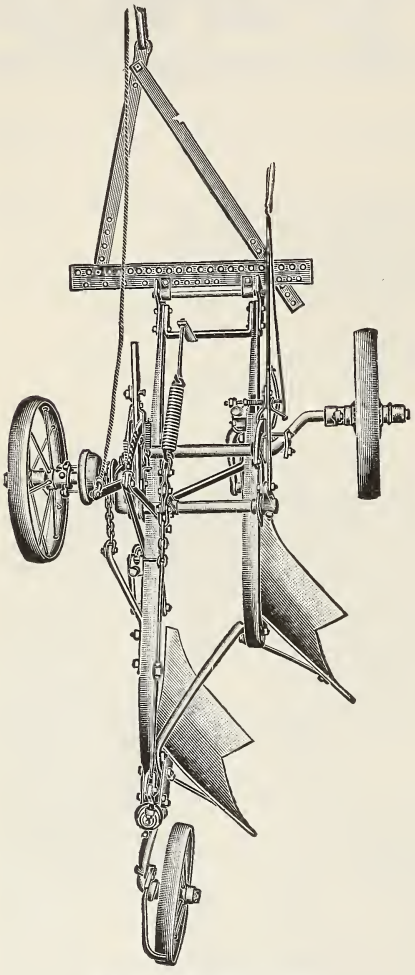


Fig. 6—The Bar Hitch.

hitch the dealer will find this simple explanation effective.

The true line of pull of a single drive wheel tractor may be considered for all practical purposes to pass through the center of the rim of the driver. Fig. 5 shows a cross chain hitch for an extreme type of single drive wheel tractor which runs with the driver in the open furrow.

The principles and adjustments of the crotch chain and bar hitches are the same as those of the cross chain hitch just described. There is little foundation for the belief that the cross chain is more complicated than the other types, though perhaps it is true that the effects of its adjustments are harder to predetermine. The cross chain hitch has some advantages. It reduces the effect of crooked steering to a minimum, and it allows the engine to be turned sooner at the headlands without disturbing the plow in the furrow. The bar hitches have become very popular on the smaller sizes of gangs because they are easily attached and adjusted, they are more readily understood, and they permit backing when made heavy enough to prevent buckling. The adjustments of the bar hitch may be studied by applying the above rules to Fig. 6.

The Set of Coulters.

The influence of the set of the coulters upon the quality of plowing is very apt to be underestimated even to a greater extent by the dealer than by the farmer. Improperly set coulters may cause poor scouring, poor trash covering, heavy draft, furrow bank breaking, and unequal widths of cut.

Ordinarily the coulters should be set from one-half to five-eighths of an inch to land. In stubble ground they should cut from one-half to two-thirds of the depth of the furrow and they should be so placed on the beams that the bearings are about over the points of the shares as shown in Fig. 4. In sod plowing the blades should be moved forward on the beams slightly, and lowered to cut nearly the full depth of the furrow. But little fear need be entertained for the coulter blades in stony ground for good coulters will stand more abuse than the shares.

If difficulty is being experienced in covering wet, coarse trash, such as wet cornstalks, relief may sometimes be had by raising the coulters slightly and by moving them back and closer to the shins of the moldboards. In this position the blades are often enabled to mount the trash and carry it down to be sheared against the shins.

HOW TO ESTIMATE HORSE POWER

(Note—The dynamometer test is the only accurate means of determining the horse power of an engine).

In estimating the output of power of a motor the speed and the piston displacement are the essential factors. The formula for this computation as adopted by the Society of Automotive Engineers is as follows: The square of the cylinder bore is multiplied by the stroke of the piston, both in inches. This in turn is multiplied by the number of revolutions of the fly wheel per minute. If more than one cylinder, multiply again by the number of cylinders. Assuming 14,000 as a constant, the formula will appear thus:

$$\text{Brake horse power} = \frac{D^2 \times L \times N}{14{,}000}$$

D equals the cylinder bore; L is the length of the stroke and N the number of revolutions per minute.

OPERATION OF THE TRACTOR GANG PLOW

BY C. O. REED.

There is good foundation for the general belief hat power plows are not usually troublesome. It vas clearly shown, however, at the last few years' ractor demonstrations that under some conditions he engine gang can baffle even the best of experts.

It is very probable that the soil conditions in ome sections in the spring will cause operators of oth old and new outfits to seek the dealer's expert dvice, and it is hoped that this discussion will rove useful to the dealer's force in the solution of ome of the problems that are sure to arise.

Excessive Draft.

Of course, sidedraft in the engine gang will cause eavy draft because of the extra friction on the andsides resulting from the side thrust. In flexble beam gangs the trouble can be relieved by engthening the hitch or by making such hitch adustments as will throw more of the sidedraft into ie engine as described in a previous article. The ame remedies will be effective in rigid beam gangs, ut in this latter type of plow further relief sometmes may be had by setting the rear furrow wheel ver on the frame toward the unplowed land or by djusting it to lead farther away from the furrow ank.

Heavy draft, however, is not the result of sideraft alone. Dull shares and increased suction are he hidden causes for much trouble, and the dealer hould not allow the plow to be blamed for poor vork due to factors for which the operator is enirely responsible. It seems to be a foregone conlusion with some farmers that an engine gang will tand all sorts of abuse simply because it is hauled y mechanical power. They will often attempt to se shares which they know are too dull to work atisfactorily on a horse gang. It is well to remind uch operators that dull shares can easily increase he draft of an engine gang 45 per cent, as was demnstrated at the 1909 Winnipeg motor contest.

If complaint comes to the dealer that a certain ang has excessive draft after the shares have been epointed, or that the bottoms tend to "bob" along n their furrows instead of working steadily at the roper depth, examination will probably reveal the act that the blacksmith has increased the share uck "just for good luck" so the plows will be sure o penetrate. Some blacksmiths, too, have an idea hat perfect adjustment in a plow is not necessary s long as the implement is hauled by an engine. Advise customers to measure the share suck of a ew share by holding the straight edge along the ottom of its land face, then to insist upon the local mith maintaining the original suction insofar as ossible when the shares are redressed.

Manufacturers very carefully design their plows to carry a certain amount of suction and changing their design is dangerous practice. Of course, flexible beam plows carry special suck regulators, but the primary purpose of such devices is to enable operators to maintain the proper suck when the depth of plowing is changed instead of affording a means of increasing the suck so that the use of very dull shares may be continued. If difficulty is being experienced in securing penetration with sharp shares in fall plowing, or if scouring becomes troublesome, it is practical to attempt relief by adjusting the suck regulators, as will be suggested later; but before letting the blacksmith attempt to remedy all ills by increasing the share suck, seek the manufacturer's advice for the specific conditions. The manufacturer knows more about the working of his plows under adverse conditions than all the blacksmiths alive.

Furrow Bank Breaking.

Furrow bank breaking is usually caused by excessive landside pressure due to sidedraft. The first remedy is to relieve the plow somewhat of sidedraft, as suggested above under "Heavy Draft." Further relief may sometimes be had in soft ground by setting the coulters closer, and in hard, dry ground by setting them wider.

Failure to Penetrate.

If sharp shares and sharp coulters on a flexible beam plow fail to penetrate, advise the operator to move the coulters ahead a couple of inches on the beams and to increase the suck of each bottom slightly by means of the suck regulators. If the same condition is encountered with a rigid beam gang, better penetration may often be obtained by moving the coulters back and by increasing the suction if possible. These rules are general and worth trying, though they will not be found applicable to all conditions. The operator should remember that increased suction means increased draft. He should also be warned that if the suck is increased too much in a flexible beam gang the bottoms will suddenly lose their penetrating ability and will jump or bob along in their furrows much the same as one's fingers will vibrate when forced at a certain angle over a pane of glass. If one bottom in a flexible beam gang bobs, the cause may be traced to a partially crushed break pin which has allowed the suction of that bottom to increase.

Failure to Scour.

Non-scouring is such a vexing trouble that a rather full discussion of its causes and remedies is warranted. At the outset dealers should understand two fundamental principles in regard to non-scouring. First, the trouble is usually caused by the fine

soil that breaks loose from the furrow slice; and secondly, any adjustments that tend to increase the pressure of the slice upon the moldboard will usually help to eliminate the trouble.

A hitch which allows excessive sidedraft may cause non-scouring. In this case any slight breaking of the furrow banks by the landsides will allow the molds to drop back sufficiently from their proper position to render the curvature of the path of the soil less sharp. The pressure on the molds may then be decreased just enough to prevent the soil from being shed properly from the surfaces. The remedy, of course, is to be found in the hitch. Throw more of the sidedraft into the engine. If the engine is already absorbing as much of the sidedraft as it can care for, try lengthening the hitch. If it is found impossible to remedy the trouble by hitch adjustments on a flexible beam gang, slightly increase the suck of each bottom or wing each plow down a trifle. Either of these adjustments will increase the pressure of the soil on the molds, but they may cause other difficulties and should be used only with the greatest of care and as a last resort. On some rigid beam gangs the rear furrow wheel may be adjusted to relieve the landside pressure, and thus non-scouring may be remedied in this way if the hitch adjustments referred to fail to yield the desired results.

The set of the coulters has a decided influence on scouring under some conditions. If the coulters are set too close a greater amount of fine loose soil may find its way into the moldboards and cause trouble. On the other hand, if the blades are set too wide there seems to be increased pulverization at the shins due to the dragging of the soil at those points, and if this fine soil passes onto the molds, non-scouring is sure to result under some soil conditions. Yet setting the coulters just slightly wide will often greatly relieve non-scouring because the extra width of furrow slice resulting seems to produce enough additional pressure on the molds to keep the surfaces clean. If setting the coulters slightly wide does not bring relief, move the blades forward a little and set them wide. With the coulters in this position some of the loose soil can drop past the shins to the bottom of the furrows and hence does not pass over the moldboards to prove troublesome. This latter adjustment is the first to be attempted by some plow experts where an obstinate condition is encountered.

It sometimes happens that those bottoms which plow up the tracks of the engine drivers will scour better than the other plows. The farmer should understand that this is due to different soil conditions, and he should not conclude necessarily that the bottoms are not adjusted alike and that the manufacturer is therefore to blame. Under such conditions better scouring may sometimes be effected by adjusting the coulters on those bottoms which give the trouble, but further adjustment than this usually proves impractical.

An unsuspected cause for failure to scour in some instances is the speed at which the plow is run. If a gang is designed to work perfectly at a speed of two and one-half miles per hour, it may fail to scour if run only two miles per hour. The reduced speed will probably be the result of the too frequent habit of overloading the power. It should be remembered, also, that the slipping of the engine's drivers due to overloading causes a loss of power and increased wear and tear on the transmission. Some farmers are quite inclined to want to "soak it to the engine." They figure that an 8-16 h. p. tractor should pull four bottoms if four horses pulled two. Also at purchasing time they fail to consider that they will expect the engine gang to plow deeper than the horse plow. Warn your customers not to select a plow that is too large for the engine. On such points as this the dealer can do the farmer a real service and gain his confidence. The theory that "a bird in the hand is worth two in the bush" does not always hold in sales work, for the business to be gained by insuring ultimate satisfaction may be much more valuable than any slight temporary gain due to selling an extra bottom.

If failure to scour is due to slow speed caused simply by using a plow which under normal conditions is too large for the engine, all that can be done with the gang is to plow shallower unless one bottom can be detached or raised. This condition, however, is not to be confounded with the condition which will be met in the spring in many sections where the slow speed will be caused by excessive slippage due simply to the soft, friable condition of the surface of the fields. If the cause for the trouble is simply the tractor's inability to grip the ground, attention should be given to the engine's drivers. The addition of chisel shaped lugs may be all that is necessary to bring complete relief.

Under some soil conditions non-scouring may become troublesome with the engine gang when an attempt is made to plow a trifle deeper than was customary with the horse plows. The loose, friable soil of the surface layer cannot force the sticky soil of the subsurface layer off the molds. This is an obstinate condition to encounter. It sometimes becomes necessary to wait until fall before attempting to break into a tenacious plow sole if it is desirable to penetrate it only to a slight degree. If there is no objection, however, to breaking into this subsurface layer to a greater depth, increasing the depth of plowing may remedy entirely the non-scouring because the pressure on the moldboards will be increased.

Rust is a too well known cause for non-scouring to deserve discussion here, but it should be mentioned to emphasize the wisdom of swabbing off the

surface of the molds with an oily rag when the gang is left at night.

The above rules for non-scouring are general rules for average conditions. No specific advice can be given for unusual conditions until the local factors causing the trouble can be studied, but it will be well for the dealer to keep in mind the two fundamental principles named above.

When a new plow is started where non-scouring is apt to be troublesome, advise the operator to remove thoroughly the lacquer from the molds with varnish remover. If lye is advocated for this purpose, warning should be given to wash, dry, and oil the surface thoroughly after the lye has been applied unless the plow is to be put into the soil at once.

Uneven Furrow Crowns.

A high or low furrow crown occurring regularly is due to poor hitch or plow adjustments, and an attempt should be made to eliminate the trouble in order that the plowed surface may be as easily and uniformly pulverized as possible by the subsequent tillage operations. If every second, third or fourth furrow slice lies higher or lower than those adjacent where a rigid beam gang is used, it is very evident that the front bottom is not cutting the proper width, and the hitch adjustments should be made which were described in a previous article. Uneven furrows occurring regularly where a flexible beam gang is used may also be caused by one bottom cutting too wide or too deep, or by one coulter being improperly set. If mud accumulates on the face of one gauge wheel to a greater degree than on the other gauge wheels, the depth of plowing of the corresponding bottom will be less than that of the others and a low crown may result. The remedies for these causes are obvious.

The packing of the drive wheels may result in low crowns being thrown behind the drivers. This of course is due to a soil condition and it is unwise to attempt plow adjustments to effect a remedy.

Engine Racing.

Old operators need no advice about the disadvantages of letting the engine race when it becomes stuck by the plow in a low spot, but a word in this regard to new owners may be timely and is sure to be appreciated. The more the engine races in one spot the harder it will be for the tractor to force itself out of the holes which the drivers have dug. Repeated trials make a bad matter worse. As soon as the engine begins to race lighten the load by raising the bottoms a little. If the engine still cannot free itself, detach it from the gang, run it ahead a few feet onto unbroken surface, and then connect it to the gang by a chain. After the plow has been pulled through the troublesome spot, the two implements can be recoupled and plowing continued at a reduced depth until there is no further danger. On the next round the careful operator will raise the bottoms slightly as the troublesome spot is approached.

Laying Out Fields.

A good system of laying out fields is one in which loss of time in turning is reduced to a minimum and as little unplowed ground as possible is left at the fence corners. The old system of starting at the center of the field and plowing around and around toward the outside is still in vogue where large outfits are used in large fields. It reduces loss of time to the minimum, but it also leaves a large amount of unplowed ground at the corners.

Plowing the field out in lands is the best system to be used with small outfits. Advise the operator to set a row of stakes around the entire field from twenty to thirty paces from the fence. At each end of the field a guide furrow should be plowed along the line of stakes and a strip the full width of the gang can be plowed along the row of stakes at each side of the field. The center area should then be plowed out in lands of convenient width, the headlands and side strips being left to be turned last by running the outfit around the center area. This system will be found applicable to triangular and irregular shaped fields as well as to rectangular fields, and the next season the soil can be thrown in the opposite direction if desired.

FACTS ABOUT PLOW BOTTOMS

FORM, CONSTRUCTION, ADAPTABILITY AND DRAFT OF VARIOUS SHAPES EXPLAINED.

BY C. O. REED.

Plows! The historian has written about them, the poet has sung about them, and the fiction writer has proudly involved them in romance; to be less aesthetic and more practical, the manufacturer has puzzled over them, the dealer has built

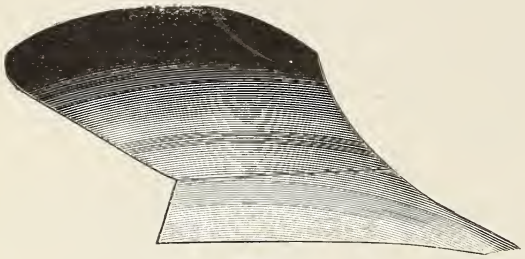


Fig. 1.

up a trade around them, and the farmer has fed the world with them for years. In short, plows have been thought about, talked about, written about—and even kicked about—since the year 1.

There seems no excuse, then, for discussing the subject now unless the discussion is a strictly scientific one as the result of recent research which adds materially to our fund of knowledge. Some progressive farmers, however, are beginning to ask what may seem to the dealer some rather far-fetched questions. It is a sign of the times. Farmers are going to ask more and more questions about plows, and, in fact, about all implements. The answers to many of these questions have been presented heretofore in various articles, bulletins, and books, but the references have been misplaced and the gist of the answers forgotten. There is a reason for this article, then, for it is an

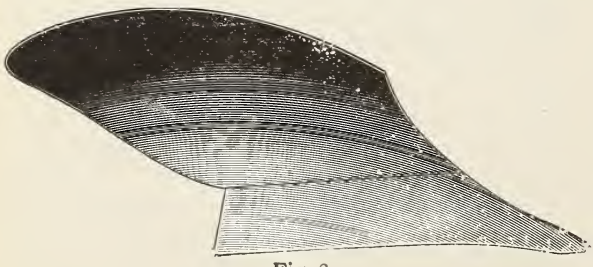


Fig. 2.

attempt to collect under one heading for ready reference some information about plows which dealers will find useful these days when discussing plows and plowing with their customers.

The Stubble Bottom.

It is well known that moldboard plows are divided into three general classes as to shape, namely, stubble plows, general purpose plows and sod plows. Typical forms of each of these general classes of bottoms are shown in Figs. 1, 2 and 3.

The stubble or old land bottom, shown in Fig. 1, has the shortest, most abrupt turning moldboard of the three types, or, in other words, its mold has the greatest curvature. Hence, bottoms of this type have the greatest pulverizing effect on the furrow slice because they bend it most abruptly, and, inasmuch as they perform more work on the slice, stubble bottoms have the greatest draft of the three types when all are used in the same soil under the same conditions. With a stubble bottom in old land in good condition for plowing, the furrow slice is completely broken up into a mellow mass, and light, fine trash is well mixed with the soil more or less throughout the entire depth of the plowed layer.

As the name implies, the stubble bottom is de-

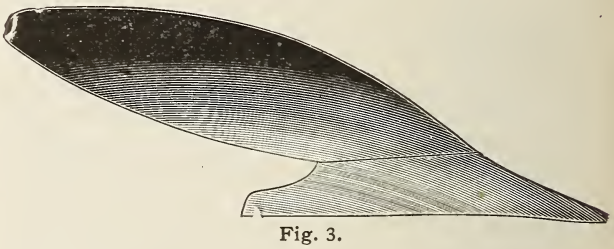


Fig. 3.

signed primarily for use in stubble or old ground, and it is usually to be recommended to farmers and gardeners who grow cereal or cultivated crops year after year on the same ground and who desire as much pulverization as possible in the plowing process. The stubble bottom will give fair satisfaction in very tame or new sods, but it is very apt to break such a furrow slice frequently, causing the slice to "buckle" badly in places and to drop back into the open furrow. This results in a rough surface of poor conformity. Under some conditions the stubble bottom leaves some air spaces under the plowed soil, but it should be remembered that such air spaces are not detrimental providing they are filled by the subsequent tillage operations if the soil is being prepared for immediate seeding.

The General Purpose Bottom.

The fact that we had both sod and stubble to turn each year on the average farm and could not practically invest in a complete, special plow for each purpose, led to the wide use of the general purpose bottom, a typical form of which is shown

in Fig. 2. In some localities this plow is known as the turf and stubble plow.

The mold of the general purpose bottom is longer than that of the stubble, and its curvature is not as great; hence, its pulverizing action and draft are less. It is fairly well adapted to a wide range of conditions and soils and is probably the most common bottom used in districts of diversified farming. It is designed for use in both stubble and tame sod; in the former it does a fair job of pulverizing, yet its curvature is not sufficient to badly buckle the furrow slice in sods. The general purpose bottom will handle a fair amount of surface trash, but instead of mixing it with the soil, as does the stubble plow, it is more apt to carry the trash to the bottom of the furrow. This gets the trash well out of the way, but there is some danger that a heavy mat of trash on the plow sole will hinder the passage of soil water from the plow sole to the seed bed.

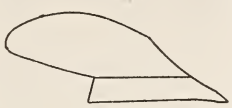
	 Stubble Bottom	 Turf and Stubble, or General-Purpose Bottom	 Sod, or Breaker Bottom
Shape	Mold short Curvature of mold greatest	Mold medium in length. Curvature medium.	Mold long. Curvature least.
Pulverizing Effect	Greatest	Medium	Least
Draft	Greatest	Medium	Least
Adaptability	For stubble, or old ground	For stubble, and tame sods.	For old sods, or virgin prairie.

Fig. 4.

The typical sod plow, or breaker bottom, shown in Fig. 3, with its long, easy turning mold, is not primarily a pulverizer; it is an inverter, nearly completely inverting tough sod without breaking

up the furrow slice. It is obvious that the pulverizing effect and the draft of the sod bottom is less than that of the other classes described when all three types are used under the same conditions. The typical breaker bottom is used in virgin sods, or in very old, tough sods such as old blue grass pasture. The typical sod plow is not common on the average, highly tilled farm, yet mild forms of it can be used to good advantage under certain conditions which will be described later.

Some of the above facts are placed in table form in Fig. 4, so that direct comparison may be had for ready reference.

pose types. This fact is not surprising when one considers the great variety of soils throughout the country and the variety of conditions in which these soils may be found. In the last analysis, however, all the moldboard bottoms can be classed in the three general classes shown in Fig. 4.

What the Farmer Will Demand.

Thus far farmers have not been insistent in their demands for plows in which interchangeability of bottoms is possible. Due to their own observations and to the teachings of soil physicists, however, they are fast coming to plows of this type, and when the experiment stations and manufacturers, work-

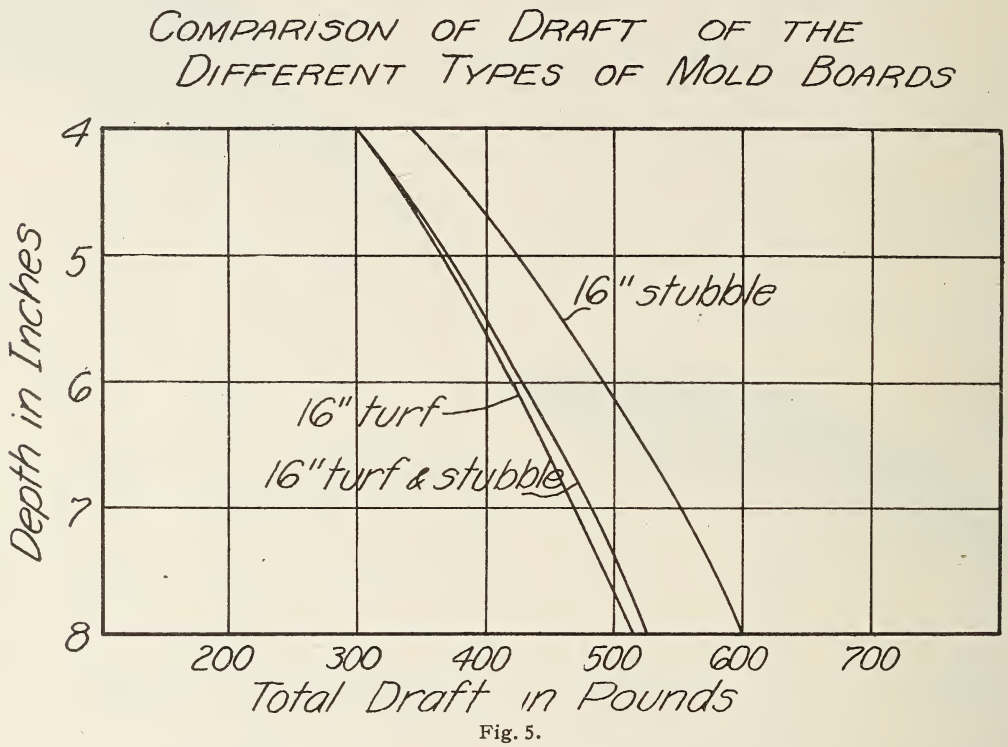


Fig. 5.

There Are Hundreds of Shapes.

It must be remembered that each of the general classes of plows described above embraces a large family of plow bottoms. There are several different shapes of stubble bottoms, several different shapes of general purpose, and many types of sod plows. The shapes in each class vary from mild to extreme forms, and any two near-like forms may vary so slightly that only delicate measurements can detect the difference. Yet each shape has its specific purpose, for somewhere a soil condition demands that shape, and ofttimes only that shape is successful there.

Every large plow manufacturer is compelled to keep in stock many designs of each of the three general classes, one large factory listing nearly a thousand different kinds of bottoms, probably four-fifths of which are of the stubble and general pur-

ing together, have pushed their scientific studies a little further, the demand for a general purpose plow frame with three or four interchangeable bottoms, will be a reality. Why? Let us see.

There is need now for a plow which carries a stubble bottom for stubble work and a mild sod bottom for work in sod.

Under some conditions a general purpose bottom breaks up the furrow slice into large clods which undergo beneficial physical changes due to weathering thru the winter. For this reason, and because it has lighter draft, the general purpose bottom is sometimes to be strongly recommended for fall plowing in stubble land, even tho the same field, if plowed in the spring, would require a stubble bottom of extreme type.

The soil on many farms varies; it may vary from a sandy to a clay loam. As a rule, a good sandy

soil can always be plowed to advantage with a stubble bottom. But if a clayey soil is a little too moist and yet must be plowed, it should be turned with a mild sod plow or extreme type of general purpose bottom to lessen the puddling tendency; on the other hand, if the same soil is very dry a stubble bottom would be most effective.

Besides the variation in moisture content and other physical characteristics of the soil between different years, seasons and fields, the amount and character of the surface trash and the desirable depth for plowing may change. This may call for a change in bottoms if the soil is to be handled in the most efficient way. When we consider that the plow is the most efficient tillage implement now in general use, that a slight change in the efficiency of the implement means a loss or gain in dollars and cents, and that the alert farmer is beginning to figure on the proposition, we can no longer refuse to believe that the day of interchangeable bottoms is coming. When it does come the good dealer should be one of the beneficiaries.

Effect of Type of Bottom on Draft.

The curves in Fig. 5 are drawn from data secured by Mr. C. A. Ocock in thesis work at the University of Illinois. Mr. Ocock's tests were made with a sulky plow frame in which a typical stubble, general purpose and sod bottom were used. The tests were conducted in a stubble field on brown silt loam in good condition for plowing, and the data bear out the theory that the stubble bottom has the greatest draft, that the sod has the least draft at every depth, and that the draft of the general purpose bottom falls materially between these two extremes.

Effect of Width and Depth of Furrow on Draft.

In comparing the draft of two plows of different widths working at the same depth, or of the same plow at different depths, it is necessary, of course, to reduce the draft to a basis which makes possible a direct comparison between the power required and the work done. In other words, it is necessary to secure the draft per unit of soil turned. The draft per square inch of furrow slice turned is the draft unit used, and it is found by dividing the total draft of the plow by the number of square inches in the cross section area of the furrow slice.

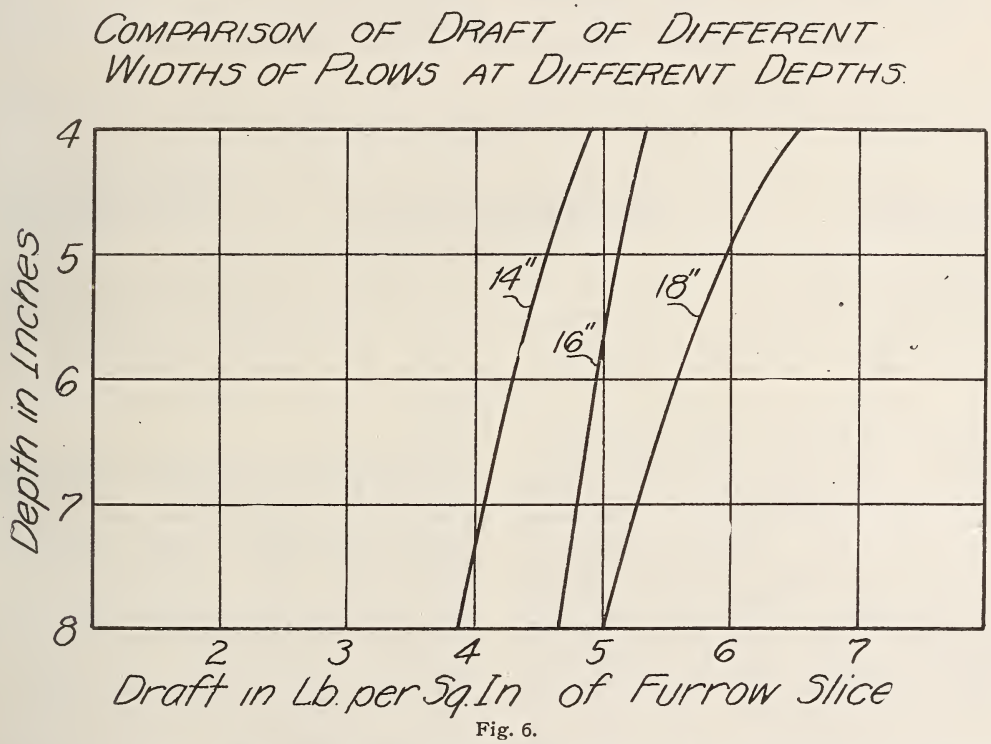


Fig. 6.

The curves in Fig. 6 are plotted from that part of Mr. Ocock's work in which he used three sizes of typical stubble bottoms, and the draft is given in pounds per square inch. It should be noted that the draft of a 14-inch bottom per square inch of furrow slice turned was less than that of a 16-inch bottom at any depth from four to eight inches.

Within the limits of the data presented, it would seem from these curves that the narrower the plow the more economically it performs, and actual practice bears out the truth of this assumption, especially in stubble land. In sod lands, however, practice has proven that the wider plows are necessary to perform good work even tho a greater draft per square inch must be suffered. It might seem also

that a 6-inch or 8-inch plow would be more economical than one whose width is 12 inches or 14 inches. While this might be true so far as the power consumption is concerned it would be impractical to resort to bottoms of such widths for general plowing over four inches deep, because the narrow bottoms would fail to cover trash and their pulverizing action would probably be decreased.

Manufacturers claim that outside of certain limits the depth of plowing must generally decrease as the width of the plow decreases if the efficiency of the implement is to remain constant. For general farm work they have determined that the best range of width is from 12 to 18 inches, tho a 16-inch plow is often considered the upper limit. Inference is not necessarily to be drawn from these remarks, however, that the draft of a 14-inch bottom can be decreased by adjusting the plow to cut only 12 inches wide.

The curves in Figs. 5 and 6 also present the interesting fact that with all bottoms the draft per square inch decreased as the depth of plowing increased. In Fig. 5 it can be seen that plowing one-half deeper added from 30 to 40 per cent to the draft instead of 50 per cent., and that doubling the depth added from 65 to 75 per cent to the draft instead of 100 per cent, as one might at first suppose.

It has been assumed for some time that about one-half of the total draft of a plow is caused by cutting loose the furrow slice, that about one-third is caused by the friction of the soil on the plow parts, and that about one-sixth is due to raising and turning the furrow slice. If this assumption is nearly correct it may partially explain why the draft per square inch increases with the width of the furrow, and decreases as the depth of plowing becomes greater. A furrow slice 4x14 inches has a line 18 inches long which must be cut to free the slice, and the slice has a cross section area of 56 square inches—a proportion of 1 to 3. If the furrow is increased two inches in depth, the length of line which must be cut increases to 20 inches and the cross section area of the slice becomes 84 square inches—a proportion of 1 to 4.2. Within the limits of the data presented, therefore, as the furrow became narrower or deeper, the influence of the resistance of the cutting edges of the plow on each square inch of cross section of the slice became less, and we have, finally, the rule of Rumely and Ellis: "In relation to the size of the furrow the cutting edge should be as small as possible." This rule, of course, is given from the standpoint of draft only.

It would be well now to note what some soil physicists say regarding the position of the furrow slice, and regarding the depth and width of furrow. The following quotation is taken by permission from the excellent work of Lyon, Fippin and Buckman, "Soils: Their Properties and Management," published in 1915 by The Macmillan Company, New York.

"Considerable care should be taken concerning the angle at which the furrow slice is placed. It is seldom desirable to completely invert the soil. If it is too flat, the stubble and rubbish are matted at the bottom of the furrow and tend to interfere with capillary movement for a considerable period. This may cause serious difficulty on spring-plowed soil, where the capillary connection does not have time to be renewed before a crop occupies the land. If, on the other hand, the furrow is too steep, the proper pulverization does not take place and the turning under of stubble and rubbish is not satisfactorily accomplished. The stubble and rubbish are likely to interfere with subsequent operations.

"The best angle at which to turn the furrow slice is about from 30 to 40 degrees with the horizontal. A furrow thus set furnishes ready entrance for rain water and facilitates the best aeration for the soil. Such an angle is especially to be recommended for turning under green manures. The capillary connections with the subsoil are not broken and the green material is well distributed from the top to the bottom of the furrow. Where a sod is to be plowed, a flatter turning of the furrow is advocated in order to increase the packing and avoid the danger of the sod's interfering with subsequent cultivation.

"There is a general relation between the width of the furrow slice and its depth. In general, it may be said that this ratio is about two in width to one in depth. The greater the depth, the less in proportian may be the width of the furrow slice.

"On a clay soil in particular there is also a relation between depth and condition. A wet soil should be plowed more shallow, other things being equal, than a dry soil, because the puddling action is less. On a dry soil the depth should be increased, in order to increase the pulverization. Combining these principles, then, it may be said that if a clay soil must be plowed when too wet, it should be plowed with a sod plow and to as shallow a depth as permissible. But on an over-dry soil the opposite conditions should be fulfilled—that is, the use of a steep moldboard and to an increased depth. Likewise, on a sandy soil, where the aim is generally to compact the structure, this may be furthered by deep plowing with a steep moldboard when the land is over-wet."

Plow Metals.

Plow metals, as well as plow shapes, have been the subject of very extensive and costly investigation. As a result, the three common metals used today are chilled iron, soft-center steel and crucible or "solid" steel. A sample of each of these metals is shown in Fig. 7.

It will be noticed in Fig. 7 that the hardened crystals of chilled iron are placed in such a way that their ends only are exposed to the wearing action of the soil. This, with other features of chilled metal, render chilled molds and shares very resistant to the wearing and scratching effect of gritty soils, and resistant to rust. Thus, chilled plow parts are used extensively in loose, sandy and gravelly soils, or where little difficulty is experienced with scouring. All molds and shares are bound to wear badly in gritty soil, but the thickness of chilled metal, its hardness and its cheapness render its use most economical in soils where it can be used successfully. Chilled shares, however, are somewhat brittle and as a rule do not carry as keen a cutting edge as steel shares. Old chilled shares cannot be forged sharp, but their cheapness makes their early replacement by new shares practical.

Fig. 7.

For sticky soils, where scouring is often difficult, the trade has been forced to use soft-center steel, which is the most expensive plow metal in general uses. The outside layers of sample B in Fig. 7 are high carbon steel fused to the center layer of softer steel, which gives strength to the plate. Altho it cannot be said that the surface layer of soft-center steel is harder than that of chilled iron, still it is of a much finer texture. Its density, together with its extreme hardness, render it capable of taking on a very high land polish, and for this reason genuine soft-center steel has found wide favor in soils in which scouring is difficult.

It will be noticed that soft-center steel is not as thick as chilled iron. For this reason, because of its greater cost, and because it is apt to scratch up badly in stony soil, soft-center steel cannot be used in gritty soils as economically as chilled iron. Soft-center steel shares carry a keen cutting edge and they can be forged sharp if care is taken in the process. They cannot be sharpened, however, as easily as crucible steel shares.

Crucible or solid steel cannot be tempered as hard as soft-center steel and hence has not the scouring qualities of the latter. It is cheaper than soft-center steel, however, and is used extensively for both molds and shares on breaker bottoms with which little difficulty is experienced with scouring on account of the tenacity of the turf. Crucible steel shares can be easily sharpened by a file or by cold hammering, and inasmuch as the mold is usually the part which fails to scour, many crucible steel shares are being sold for use with soft-center steel moldboards in sticky soils. In gritty or gravelly soils, of course, the wear on crucible steel parts is considerable.

The subject of plow metals is an extremely important one to the dealer because it is of vital importance to the farmer. Every dealer should talk the subject over with salesmen of reliable manufacturers until he has mastered every detail of interest to his customers.

Many bogus shares are tempting the farmer. Usually such shares are made by manufacturers who do not market plows and who, therefore, do not have to assume the responsibility of upholding the name and reputation of any particular make of plow. Such shares are often made of inferior metal, and often they do not fit to the plow bottom properly. They are sometimes handled by mail order house, and although they cannot bear the trademark of the manufacturer whose shares they imitate, still they may be marked "For John Jones Plow Co. No. 2," which includes the names of the maker of the plow. Dealers should caution their customers concerning such points. The use of bogus shares is to be recommended for some few conditions, but if perfect fitting shares of good quality are desired it is best for the operator to secure his shares from the company which manufactures the plow and stands behind its product with its good name and trademark.

Unjust Criticism of Plows.

I cannot conclude this article without another word regarding unjust criticism of plows. It was stated above that a very slight change in moldboard design might mean the success or failure of a plow for a certain soil condition, and that large manufacturers carry hundreds of different patterns to meet the great variety of conditions which their line of plows encounters. It is obvious then

that it is unjust to condemn a certain manufacturer's line of goods simply because one of his many styles of bottoms fails to give satisfaction under some certain condition. If the manufacturer is notified of the dissatisfaction he will probably be able to replace the old mold with a new shape that will work admirably.

Often at plowing demonstrations and at fairs one notices that a Jones plow does much better work than a Smith, but if he cares to follow the demonstration to the next town, perhaps only six miles distant, he may find that Jones' plow fails badly while the Smith bottom gives excellent satisfaction. In either case, probably the unsatisfactory plow could be made to perform admirably if the proper mold was attached. It is not to be inferred from this, however, that poor work is always due to improper correlation of the shape of the mold to the soil conditions. Poor plowing is very often due to improper manipulation, and condemnation of the implement should be the very last resort for anyone, whether he be farmer, dealer, or salesman.

TRACTOR DISK PLOWS

Disk plows came into use less than twenty years ago and are comparatively new. Moldboard plows were used universally previous to that time and thus are better known generally. Disk plows having no landsides must necessarily be wheel plows. All hand plows will therefore continue to be moldboard plows.

Among wheel plows the disk plow has proven its usefulness in all general work and its superiority in many kinds of special work. A rolling motion being easier than a sliding motion causes the draft to be less. It thoroughly pulverizes the soil, making it superior for all stubble plowing. The scraper cleans the disk continually, so that it will plow in sticky land where it is impossible to plow with other plows. Because of the different method of penetration it is possible to plow with a disk when the ground is so dry that it is impossible to make a plowshare enter the ground. It is also possible to plow in new ground where there is much brush and other small growth. Breakage in new ground will of course sometimes occur, but the disks will generally either roll over or cut through the roots.

Disk Plows Are Pulverizers

Disk plows are not so good as moldboard plows for sod, for the former is essentially a pulverizer. Consequently it tears up the sod to such an extent that the perfect inversion of the furrow is impossible, and where such plowing is desired moldboard plows should be used. There are exceptions however to this rule. If it is desired that the sod be torn up and exposed to the sun to kill the grass roots, the disk plow is advisable. Also where the soil is loose or the roots go straight down, as in the case of clover, then a disk plow is good.

The advent of the tractor has caused a large increase in the use of disk plows. Tractor plows are always in gangs. If flat bottomed plows are used they must be made and kept lined up with extreme accuracy, which is difficult and sometimes impossible after the plow has been used and more or less sprung out of shape. No such nicety of construction and adjustment is necessary with disk plows. The wear of disks does not affect the running qualities of a plow like the wear of shares. A disk plow is so simple and requires so little adjustment that expert work is seldom necessary.

The greatest number of disk plows now in use have the frames so constructed that the furrows can be made any width from 6 to 10 inches. The standard width is 10 inches, but the tendency is toward narrow furrows. Eight inches is quite common now. The number of disks can be increased and the width of furrows decreased without materially altering the draft if the total width of the gang is not changed.

Deep and Shallow Plowing

The relation of depth to width with disk plows is somewhat different from other plows. Narrow furrows are better for deep plowing. Ten-inch furrows are best for 6 to 8-inch depth. Eight-inch furrows are best for 8 to 10-inch depth. Six or 8-inch furrows are best for 12-inch depth. The rule is that a wide furrow slice may be cut when plowing shallow or a narrow furrow slice when plowing deep.

It is so much easier to do deep plowing with a disk plow that it is almost invariably put deeper into the ground, which of course takes additional power. This often causes plows to be selected that are too large for the tractor. No unfavorable criticism should be made of the disk plow on this account, because it is far more important to plow deep than wide.

Subsoiling is deep plowing. It is more thorough and takes less power when done at one than two operations. If moldboard plows throw the subsoil on top of the plowed ground, it sometimes is objectionable. Disk plows plow deep without throwing the subsoil on top.

Use of Wheel Weights

Disk plows have no landside to resist the work of turning the furrow. This results in a tendency to push the rear end of the plow around towards the land. This can only be counteracted by a staggered rear wheel and by hitching near the front end of the plow which makes the plow pull straight forward. If the rear wheel is not sufficient to hold the rear of the plow in position, weight should be added to hold the plow down to its work. If the push on the rear edge of the disk is not resisted as above described, the rear end of the plow will swing around towards the land and the disks will not set across the furrows properly and will not turn the furrows over. The disks should be set across the furrows at an angle of about 45 degrees.

Power Lifts

Power lifts have only recently been applied to disk plows. Like all new devices, some of them are complicated and require more or less attention. The main purpose of a power lift is to raise the land wheel when the plow is entering the ground and to lower it when coming out of the ground. This brings the disks out of the ground, but under some conditions it is not sufficient to make the plow pass over rough places without the use of the levers. To raise all the disks entirely above the rough places it is necessary to lower all three wheels.

Setting Up the Disk

In setting up disk plows see that the beams are

attached to the frame so as to cut the desired width of furrows.

Attach axle bearings with axles to frame.

Put abundance of grease on all bearings before putting the plow together.

Set up plow on wheels, attaching wheel weights if desired.

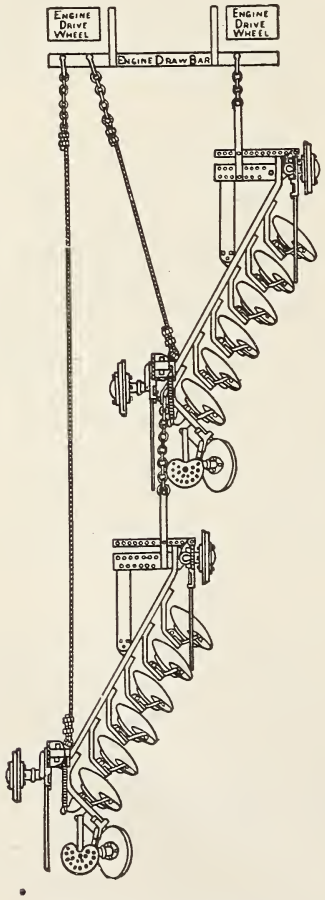
Attach grease cups to disk bearings, fill with grease and screw caps down until grease appears at the end of tube inside of the disk box.

Attach disks and scrapers.

The point of the scraper should touch the disk. The rear end of the scraper should be slightly away from the disk so that when the pressure of the earth comes against the scraper it will barely touch the disk. See that the rear end of the scraper never extends out beyond the edge of the disk.

Set the hitch as near to the front end of the plow as possible. Adjust the hitch so that front wheel will run straight forward.

Fill all grease cups and screw down caps until grease begins to come out at ends of bearings.



Hitching to Tractor

If right hand tractor drive wheel runs in furrow set front plow wheel in line with inside rim of tractor wheel.

If tractor drive wheel runs on land set front plow wheel 6 inches to the right of outside of tractor wheel.

Attach hitch chain to draft bar of tractor immediately in front of the hitch on plow. Hitch plow as close to tractor as possible. If this causes side draft let the chain out longer and hitch further to the left on the drawbar of tractor. At the same time adjust the plow hitch so that the front wheel of plow will run straight forward or possibly lead a little to the right.

If rear wheel shows a tendency to climb up on the land adjust it so as to lead slightly toward the plowed land and put on more weight.

Adjustments

Adjust plow for depth of furrows with front and land levers and by raising or lowering the rear axle on the frame. See that the frame of the plow is kept level with the ground.

When the ground is covered with heavy trash the front end of the plow can be pitched up by lowering the rear end of plow. This will allow the plow frame to clear the trash better.

Adjust for width of furrows by changing the space between the beams.

Twenty-four-inch disks are for regular work. Each disk will plow a furrow 4 to 10 inches deep and 6, 8 or 10 inches wide.

Twenty-six-inch disks are for medium deep work.

Twenty-eight-inch disks are for deep work and where the land is in ridges. Each disk will plow a furrow 4 to 12 inches deep and 6, 8 or 10 inches wide.

When the ground is hard or sticky or otherwise difficult to plow, or when extra deep plowing is wanted, weight should be put on the plow. The best way is by use of wheel weights, especially on the rear wheel. They add but little to the draft of the plow.

For soft land wide-faced wheels should be used.

Keep disks very sharp. When disks get very dull have them drawn out by a blacksmith or ground. They need no tempering, as they will retain their hardness without tempering. Do not draw to a feather edge, for that would wear off very quickly.

The object is to make the disks thinner back of the edge. The finishing touches on the edge of disk should be done with a file.

After going a few rounds tighten all nuts and continue to do so at short intervals. Keep nuts tight.

It is difficult to estimate the number and size of gang plows for tractors of different sizes. Heavy, sticky land may require twice as much power as average land. When the depth of furrow is doubled the power required will be more than doubled. For average work each disk will require about 2½ h. p. for 8-inch furrows and 3 to 4 h. p. for 10-inch furrows.

U. S. MANUFACTURERS OF THRESHING MACHINES

Advance-Rumely Thresher Company, La Porte, Ind.
Aultman & Taylor Machinery Company, Mansfield, O.
Avery Company, Peoria, Ill.
A. D. Baker Company, Swanton, O.
Banting Machine Company, Toledo, O.
Batavia Machine Company, Batavia, N. Y.
Belle City Manufacturing Company, Racine, Wis.
Buffalo Pitts Company, Buffalo, N. Y.
Cape Manufacturing Company, St. Louis, Mo.
Cardwell Machine Company, Richmond, Va.
J. I. Case Threshing Machine Company, Racine, Wis.
Clark Machine Company, St. Johnsville, Vt.
Davies Threshing Machine Company, Oshkosh, Wis.
Ellis Keystone Agricultural Works, Pottstown, Pa.
Emerson-Brantingham Company, Rockford, Ill.
Farmers Independent Thresher Company, Springfield, Ill.
A. B. Farquhar Company, Ltd., York, Pa.
Frick Company, Waynesboro, Pa.
A. W. Gray's Sons, Poultney, Vt.
Harrison Machine Works, Belleville, Ill.
Heebner & Sons, Lansdale, Pa.
Heilman Machine Works, Evansville, Ind.
Huber Manufacturing Company, Marion, O.
Illinois Thresher Company, Sycamore, Ill.
Keck-Gonnerman Company, Mount Vernon, Ind.
Koger Pea & Bean Thresher Company, Morristown, Tenn.
Minneapolis Threshing Machine Company, Hopkins, Minn.
Nichols & Shepard Company, Battle Creek, Mich.
Orangeville Agricultural Works, Orangeville, Pa.
Port Huron Engine & Thresher Company, Port Huron, Mich.
The Russell & Co., Massillon, O.
Southwest Manufacturing Company, Oklahoma City, Okla.
Swayne, Robinson & Co., Richmond, Ind.
Quick & Thomas Company, Auburn, N. Y.
Westinghouse Company, Schenectady, N. Y.
Wood Brothers Thresher Company, Des Moines, Ia.

CANADIAN MANUFACTURERS

Robert Bell Engine & Thresher Company, Ltd., Seaforth, Ont.
Dominion Thresher Company, Ltd., New Hamburg, Ont.
J. B. Dore & Fils, La Prairie, P. Q.
Ernst Brothers Company, Ltd., Mount Forest, Ont.
John Goodison Thresher Company, Ltd., Sarnia, Ont.
Hergott Brothers, Ltd., Mildmay, Ont.
International Harvester Company of Canada, Ltd., Hamilton, Ont.
Macdonald Thresher Company, Ltd., Stratford, Ont.
Matthew Moody & Sons, Terrebonne, P. Q.
Sawyer-Massey Company, Ltd., Hamilton, Ont.
Stewart Sheaf Loader Company, Ltd., Winnipeg, Man.
Sussex Manufacturing Company, Ltd., Sussex, N. B.
Waterloo Manufacturing Company, Ltd., Waterloo, Ont.
R. Watt Machine Works, Ridgetown, Ont.
George White & Sons Company, Ltd., London, Ont.

TRADE NAME	Advance-Rumely				Aultman & Taylor New Century				Avery Yellow Fellow				
Model	22"×36"	28"×44"	32"×52"	36"×60"	23"×36"	27"×42"	32"×50"	36"×56"					
Width of cylinder	21 31/32"	27 11/16"	31 5/8"	36 1/8"	23"	27"	32"	36"	20"	24"	28"	32"	36"
Width rear of machine	36"	44"	52"	60"	36"	42"	50"	56"	30"	36"	46"	54"	60"
Number of bars in cylinder	12	12	15	15	12	12	12	12	12	12	12	12	12
Number of spikes in cylinder	72	92	130	160	72	84	100	116	51	60	75	87	96
Diameter of cylinder including spikes	22"	22"	28¼"	28¼"	22"	22"	22"	22"	21"	21"	21"	21"	21"
Number of bands on cylinder	3	3	4	4	3	3	5	5	3	3	3	4	4
Speed of cylinder	1075	1075	850	850	1200	1200	1200	1200	1200	1200	1200	1200	1200
Size cylinder shaft	2"	2"	2 7/8"	2 7/8"	2 3/8"	2 3/8"	2 3/8"	2 3/8"	2¼"	2¼"	2¼"	2¼"	2¼"
Length cylinder shaft bearings	7½"	7½"	8"	8"	Hyatt Roller Bearings		Hyatt Roller Bearings		8"	8"	8"	8"	8"
Length grate surface	20"	20"	29¼"	29¼"	41"	41"	41"	41"	30"	30"	30"	30"	30"
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	No	No	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Diameter main drive pulley	7" to 14"	7" to 14"	10" to 17"	10" to 17"	9"	10"	10"	10"	10"	10"	10"	10"	11"
Face main drive pulley	9"	9"	10"	10"	8"	9"	9"	9"	7½"	7½"	8½"	8½"	9½"
Number of beaters	2	2	2	2	1	1	1	1	*1	*1	*1	*1	*1
Length of straw racks	10' 0"	10' 0"	12' 10 5/8"	12' 10 5/8"	10' 6"	10' 6"	10' 6"	10' 6"	128"	128"	180"	180"	180"
Length of grain bottom and chaffer	7' 6"+40"	7' 6"+40"	16' 6"	16' 6"	12' 8"	12' 8"	12' 8"	12' 8"	115"	115"	146"	146"	146"
Rack surface in square feet	29.7	36.4	55.3	64.2	30½	36	43	48	27	32	57	67	75
Chaffer surface in square feet	9.35	11.6	14.59	17.01	7½	9	12½	14	13	16	21	24	27
Riddle surface in square feet	9.8	12.2	15.93	18.63	9	11	15	17	8	10	13	16	18
Length separator with S. F. and W. S	24' 7"	24' 7"	28' 10"	28' 10"	30' 0"	30' 0"	30' 0"	30' 0"	21'	21'	24' 6"	24' 6"	24' 6"
Height of machine at feed table	77½"	81½"	88½"	88½	6' 2"	6' 2"	6' 2"	6' 2"	50"	50"	54"	54"	54"
Height of machine at rear	78"	80"	92"	92"	9' 7"	9' 7"	9' 10"	9' 10"	10' 4"	10' 4"	11' 2"	11' 2"	11' 2"
Height of front wheels	30"	34"	34"	34"	36"	36"	36"	36"	33"	33"	33"	33"	33"
Width of front wheels	5"	6"	8"	10"	4"	6"	6"	8"	4"	4"	6"	6"	10"
Height of rear wheels	30"	34"	44"	44"	36"	36"	36"	36"	33"	33"	39"	39"	39"
Width of rear wheels	5"	6"	8"	10"	4"	6"	6"	8"	4"	4"	6"	6"	10"
Track of front wheels C to C	50¼"	50¼"	54¼"	61¼"	67½"	67½"	75"	83"	38"	38"	57"	57"	57"
Track of rear wheels C to C	62¼"	70¾"	88¼"	97¾"	83"	83"	83"	83"	69"	75"	85"	93"	99"
Average capacity per hour—Wheat	70	90	175	200	120	150	200	250	80	100	130	200	250
Average capacity per hour—Oats	110	140	250	300	160	200	265	285	100	125	160	300	350
Belt H. P. required with S. F. and W. S	16 to 20	24 to 28	30 to 40	40 to 50	28	30	45	55	16	25	36	50	80
Weight fully equipped	5250	6500	9560	10510	7075	7550	8610	9660	7100	7480	9180	10180	10820

TRADE NAME	Baker			Robert Bell					Belle City New Racine		Buffalo Pitts		
Model	30	33	36	20"×32"	24"×40"	28"×42"	32"×54"	36"×60"	20"×32"	24"×40"			
Width of cylinder	30"	33"	36"	20"	24"	28"	32"	36"	20"	24"	22"	28"	30"
Width rear of machine	50"	56"	62"	32"	40"	42"	54"	60"	32"	40"	32"	48"	50"
Number of bars in cylinder	15	15	15	9	9	9	12	12	9	9	9	12	12
Number of spikes in cylinder	125	140	155	48	57	63	78	96	51	60	54	72	78
Diameter of cylinder including spikes	24"	24"	24"	22"	22"	22"	21½"	21½"	18½"	18½"	21	21	21
Number of bands on cylinder	3	3	4	3	3	3	3	4	3	3	2	3	3
Speed of cylinder	950	950	950	1100	1100	1100	1100	1100	1300	1300	1150	1150	1150
Size cylinder shaft	2¼"	2¼"	2¼"	1 1/8"	1 1/8"	1 1/8"	2¼"	2¼"	1⅜"	1⅜"	1¾"	1¾"	1¾"
Length cylinder shaft bearings	8"	8"	8"	8"	8"	8"	8"	8"	5"	5"	5½"	7½"	7½"
Length grate service	30"	30"	30"	20"	20"	20"	20"	20"	26"	26"	22"	28"	30"
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Diameter main drive pulley	9¼"	9¼"	9¼"	8"	8"	8"	8"	8"	6"7"7½"8"9"	6"7"7½"8"9"	8"	8"	9"
Face main drive pulley	9"	9"	9"	8"	8"	8"	10"	10"	8"	8"	7"	8"	9"
Number of beaters	1	1	1	1	1	1	1	1	1	1	1	1	1
Length of straw racks	17'	17'	17'	11' 7"	11' 7"	14'	15'	15'	8' 6"	10' 10"	10' 1"	11' 7"	13' 9"
Length of grain bottom and chaffer	25'	25'	25'	11' 7"	11' 7"	14' 4"	14' 4"	14' 4"	10' 1½	13'	9' 8½"	10' 5"	11' 2½"
Rack surface in square feet	71	79	88	30	37	49	67.5	75	23	36	17	47	55
Chaffer surface in square feet	21	24	26	12	16	12.8	15.6	17.6	9	10	8¾	11½	26
Riddle surface in square feet	15.5	17	18.5	8.1	10.7	11.3	14.9	17	9	10¾	7	10½	10½
Length separator with S. F. and W. S	†34	†34	†34	27'	27'				19' 2"	21' 4"	20' 8"	21'	23'
Height of machine at feed table	6' 6"	6' 6"	6' 6"	5' 10"	5' 10"	6' 4"	6' 4"	6' 4"	5' 2"	5' 2"	7'	7' 2"	7' 11½"
Height of machine at rear	10'	10'	10'	8' 3"	8' 3"	10'	11'	11'	9' 0"	9' 10"	7'	7' 2"	8' 1½"
Height of front wheels	32"	32"	32"	30"	30"	33"	33"	33"	30"	30"	32"	36"	36"
Width of front wheels	6"	7"	8"	5"	5"	6"	8"	10"	5"	6"	4"	6"	7"
Height of rear wheels	38"	38"	38"	36"	36"	39"	39"	39"	30"	30"	32"	36"	40"
Width of rear wheels	6"	7"	8"	5"	5"	6"	8"	10"	5"	6"	4"	6"	7"
Track of front wheels C to C	48"	48"	48"	3' 10½"	4' 8½"	4' 10"	4' 10"	4' 10"	3' 7"	3' 8"	3' 10"	4' 9½"	6' 5½"
Track of rear wheels C to C	7'	7' 4"	7' 10"	4' 10"	5' 6"	5' 3"	6'	6' 6"	5' 8"	6' 4"	5' 3"	6' 7"	7' 3"
Average capacity per hour—Wheat	140	170	200	80	100	120	200	225	40 to 70	50 to 90			
Average capacity per hour—Oats	220	270	320	95	120	150	265	310	80 to 150	100 to 180			
Belt H. P. required with S. F. and W. S	40	50	60	20	25	36	50	50	16 to 20	20 to 25			
Weight fully equipped	8500	9000	9500	5800	6700	7200	9000	9800	4175	5600			

*Includes also I X L Separator Device. † Feeder carrier extended over blower pipe.

TRADE NAME	Buffalo Pitts—Con'd		Case							Clark Williams			
Model			20"×28"	20"×36"	26"×46"	28"×50"	32"×54"	36"×58"	40"×62"	00	0	1	2
Width of cylinder	34"	38"	20"	20"	26"	28"	32"	36"	40"	34"	30" and 34"	30"	26"
Width rear of machine	56"	62"	28"	36"	46"	50"	54"	58"	62"	50"	48"	42"	38"
Number of bars in cylinder	12	12	9	12	12	20	20	20	20	12	12	12	12
Number of spikes in cylinder	91	99	57	57	75	135	155	175	195	60 to 120	60 to 120	60 to 120	60 to 120
Diameter of cylinder including spikes	21"	21"	21¾"	22¼"	22¼"	31¼"	31¼"	31¼"	31½"	22"	22"	22"	22"
Number of bands on cylinder	4	4	1	1	2	4	5	5	5	4	4	4	3
Speed of cylinder	1150	1150	1100	1075	1075	950	950	950	950	1200	1200	1200	1200
Size cylinder shaft	2"	2"	1⅝"	1⅞"	1⅞"	2 7/16"	2 7/16"	2 7/16"	2 7/16"	2"	2"	2"	2"
Length cylinder shaft bearings	7½"	7½"	5"	7"	7"	7¾"	7¾"	7¾"	7¾"	7"	7"	7"	7"
Length grate surface	34"	38"	18.5"	18.5"	18.5"	30"	30"	30"	30"	7"	7"	7"	7"
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	Yes	Yes	Yes	Yes	Yes	No	No	No	No				
Diameter main drive pulley	9"	9"	13¼"	13¼"	12"	13¼"	13¼"	13¼"	13¼"	6" and 7"	to 8"		
Face main drive pulley	10"	10"	7¼"	7¼"	7¼"	9"	9"	9"	9"	6" and 7"	to 8"		
Number of beaters	1	1	1	1	1	1	1	1	1	2	2	2	1
Length of straw racks	13' 9"	13' 9"	120"	152"	152"	144"	144"	144"	144"	13'	13'	13'	13'
Length of grain bottom and chaffer	11' 2½"	11' 2½"	122.5"	169"	169"	159"	159"	159"	159"	13'	13'	13'	13'
Rack surface in square feet	60⅓	68¾	25⅓	46	59	63⅔	68.8	74	79.2	45 to 60			
Chaffer surface in square feet	29¾	33	8.4	11.6	13.8	17.1	18.5	20.1	21.6	14 to 20			
Riddle surface in square feet	12	13⅓	6.5	8.6	11.2	12.4	13.5	14.6	15.7	14 to 20			
Length separator with S. F. and W. S	23'	23'	23'	25' 8"	25' 8"	27' 10"	27' 10"	27' 10"	27' 10"	25'			
Height of machine at feed table	7' 11½"	7' 11½"	5' 11"	5' 11"	5' 11"	7' 6"	7' 6"	7' 6"	7' 6"	6'			
Height of machine at rear	8' ½"	8' ½"	8' 6"	8' 11"	8' 11"	10'	10'	10'	10'	6' 9"			
Height of front wheels	36"	36"	30"	30"	30"	34"	34"	34"	34"	32"			
Width of front wheels	8"	9"	4"	6"	6"	8"	8"	8"	10"	3" to 6"			
Height of rear wheels	40"	40"	30"	30"	30"	34"	34"	34"	34"	41"			
Width of rear wheels	8"	9"	4"	6"	6"	8"	8"	8"	10"	3" to 6"			
Track of front wheels C to C	6' 11½"	7' 5½"	42"			54"	54"	54"	54"	5' 2" to 6'			
Track of rear wheels C to C	7' 9"	8' 3"	60"	61½"	71½"	73"	77"	81"	85"	5' 2" to 6'			
Average capacity per hour—Wheat			40	75	100	125	135	155	175	50 to 150			
Average capacity per hour—Oats			75	140	190	210	230	260	310	100 to 300			
Belt H. P. required with S. F. and W. S			16	20	25	40	50	60	75	15 to 20	12 to 15	10 to 12	8 to 10
Weight fully equipped			3050	4700	5150	8500	8825	9150	9525	5500	5200	5000	4000

TRADE NAME	C. Williams Con'd	Ellis Keystone							Emerson-Brantingham Peerless				
Model	3	No. 1 Overshot	No. 2 Overshot	No. 3 Overshot	No. 1 Undershot	No. 2 Undershot	No. 3 Undershot	No. 4 Undershot	A	B1	C1	D	E
Width of cylinder	28"	20"	24"	28"	18½"	22"	24"	26"	36"	33"	30"	30"	24"
Width rear of machine	36"	27"	34"	37"	27"	34"	37"	42"	56"	50"	46"	46"	38"
Number of bars in cylinder	12	9	9	9	9	9	9	12	12	12	12	12	12
Number of spikes in cylinder	60 to 120	60	72	84	48	57	63	69	124	112	100	88	80
Diameter of cylinder including spikes	19"	20½"	20½"	20½"	21"	21"	21"	21½"	22 1/16"	21⅛"	21⅛"	21⅛"	21⅛"
Number of bands on cylinder	3	3	3	4	3	3	3	4	4	4	3	3	3
Speed of cylinder	1300	1050	1100	1100	1100	1150	1150	1150	1050	1050	1050	1050	1050
Size cylinder shaft	1 1/16"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"	1½"	74"×2 3/16"	69 5/8"×2 3/16"	66"×2 3/16"	66"×2 13/16"	57½"×1⅞"
Length cylinder shaft bearings	6"	4"	5"	5"	4"	5"	5"	5"	10"	8"	8"	8"	8"
Length grate surface	6"				20"	20"	20"	23"	25"	23"	23"	23"	23"
Front concave adjustment	Yes				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment									Yes	Yes	Yes	Yes	Yes
Diameter main drive pulley		5" and 6"	5" and 6"	5" and 6"	5" and 6"	6" and 7"	6" and 7"	6" and 7"	10"	9"	9"	9"	8¼"
Face main drive pulley		5"	6"	6"	5"	6"	6"	6"	9"	9"	9"	9"	8½"
Number of beaters	1								2	2	2	2	3
Length of straw racks	12'								11' 3"	11' 3"	11' 3"	11' 3"	9' 5"
Length of grain bottom and chaffer	12'	8'	10' 2"	10' 2"	8'	10' 2"	10' 2"	11'	*9' 1"	*8' 11"	*8' 11"	*8' 11"	*7' 11½"
Rack surface in square feet									50	44	41	41	28
Chaffer surface in square feet									22	19	17	17	11
Riddle surface in square feet									None	None	None	None	None
Length separator with S. F. and W. S					19' 7"	21' 5"	21' 5"	22' 7"	23' 2"	23' 2"	23' 2"	23' 2"	20' 11"
Height of machine at feed table		4' 9"	5' 4"	5' 4"	5'	5' 7"	5' 7"	5' 4"	76¾"	76¾"	76¾"	76¾"	72½"
Height of machine at rear		7' 6"	8' 5"	8' 5"	7' 8"	8' 7"	8' 7"	8' 10"	8' 6"	8' 5"	8' 5"	8' 5"	7' 8"
Height of front wheels		28"	28"	28"	28"	28"	28"	28"	40"	40"	40"	40"	36"
Width of front wheels		4"	4"	4"	4"	4"	4"	4"	8"	6"	6"	6"	4"
Height of rear wheels		28"	28"	28"	28"	28"	28"	28"	40"	40"	40"	40"	36"
Width of rear wheels		4"	4"	4"	4"	4"	4"	4"	8"	6"	6"	6"	4"
Track of front wheels C to C		5'	5'	5'	5'	5'	5'	5'	64¾"	64¾"	64¾"	64¾"	61¾"
Track of rear wheels C to C		5'	5'	5'	5'	5'	5'	5'	87¾"	81"	75⅞"	75⅞"	64"
Average capacity per hour—Wheat		25	35	45	25	40	50	65	200	160	120	100	90
Average capacity per hour—Oats		40	60	80	40	65	85	105	275	250	200	175	150
Belt H. P. required with S. F. and W. S	6 to 10	8	11	12	15	18	18	20	66	60	45	40	36
Weight fully equipped	2500	2750	3100	3300	2850	4025	4175	4700	10480	9260	8635	8585	7475

*Length of chaffer 61 inches on all models except E, which is 47 inches.

TRADE NAME ☞	Emerson-Brantingham Geiser			Emerson-Brantingham Reeves					Farmers Indep't	Farquhar Vibrator				
Model	No. 3	No. 4	No. 5	28″×48″	30″×53″	33″×56″	36″×60″	40″×63″						
Width of cylinder	25″	24″	27″	28″	30″	33″	36″	40″	40″	19″	23″	26″	29″	
Width rear of machine	29″	32″	39″	48″	53″	56″	60″	63″	40″	35″	41″	45″	49″	
Number of bars in cylinder	6	9	9	15	15	15	15	15	12	12	12	12	12	
Number of spikes in cylinder	57	57	66	125	140	155	170	185	108	51	63	72	81	
Diameter of cylinder including spikes	18¼″	18″	18″	28½″	28½″	28½″	28½″	28½″	18½″	22″	22″	22″	22″	
Number of bands on cylinder	3	3	3	4	4	4	3	3	5					
Speed of cylinder	1400	1350	1300	800 to 850	800 to 850	800 to 850	800 to 850	800 to 850	1150	1125	1125	1125	1125	
Size cylinder shaft	51¼″×1½″	54¼″×1¾″	58¾″×1¾″	2½″	2½″	2½″	2½″	2½″	1 1/16″	2″×61¾″	2″×68⅜″	2⅜″×69″	2⅜″×72″	
Length cylinder shaft bearings	4½″	6⅛″	6⅛″	9½″	9½″	9½″	9½″	9½″	4½″					
Length grate surface	None	22″	22″	22″	22″	22″	22″	22″	40″					
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Rear concave adjustment	No	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	
Diameter main drive pulley	6″	6″	6″	12″	12″	12″	12″	12″	8″-9″-10″	6¾″	6¾″	7½″	7½″	
Face main drive pulley	5½″	7″	7″	8¼″	10½″	10½″	10½″	10½″	8″	8″	8″	10″	10″	
Number of beaters	None	None	None	1	1	1	1	1	1					
Length of straw racks	7′ 4″	8′ 2″	8′ 5″	15′ 4″	15′ 4″	15′ 4″	15′ 4″	15′ 4″	129″	132	138	144	144	
Length of grain bottom and chaffer	4′ 0″	6′ 0″	6′ 8″	15′ 8″	15′ 8″	15′ 8″	15′ 8″	15′ 8″	146″					
Rack surface in square feet	16½	21	26	61	67	72	76	79	35⅝	32	39	45	49	
Chaffer surface in square feet	4	None	None	62½	68½	73½	78	81	9					
Riddle surface in square feet	2	None	None	20	22	23½	25	26½	9	9	12	14	14.5	
Length separator with S. F. and W. S	†16′ 9″	18′ 6″	19′ 4″	‡27′	‡27′	‡27′	‡27′	‡27′	26′					
Height of machine at feed table	69″	65″	68″	6′	6′	6′	6′	6′	9′					
Height of machine at rear	95″	86″	87″	8′ 8″	8′ 8″	8′ 8″	8′ 8″	8′ 8″	9′					
Height of front wheels	30″	30″	36″	36″	36″	36″	36″	36″	24″	30″	33″	33″	33″	
Width of front wheels	3″	4″	4″	5″	6″	8″	8″	10″	4″	4″	4″	4″	6″	
Height of rear wheels	40″	40″	40″	40″	40″	40″	40″	40″	30″	33″	36″	36″	36″	
Width of rear wheels	3″	4″	4″	5″	6″	8″	8″	10″	6″	4″	4″	4″	6″	
Track of front wheels C to C	61¾″	61¾″	61¾″	63″	63″	63″	63″	63″	5′ 4″					
Track of rear wheels C to C	61¾″	61¾″	70¼″	7′ 1½″	7′ 10″	8′ 2″	8′ 8″	8′ 8″	5′ 4″					
Average capacity per hour—Wheat	40	70	80	130	140	150	175	200	80	50 to 60	60 to 80	80 to 100	100 to 120	
Average capacity per hour—Oats	75	120	140	200	220	250	275	350	200					
Belt H. P. required with S. F. and W. S	8	24	36	40	50	50	60	60	20					
Weight fully equipped	2910	5215	5890	10572	11232	11492	11807	12365	4800	5350	6050	6775	7225	

TRADE NAME ☞	Farquhar Vibrator—Con'd		Farquhar Rake		Frick Junior		New Frick	John Goodison				Gray's Sons	
Model								20″×38″	24″×42″	28″×42″	36″×50″	No. 231	No. 261
Width of cylinder	32″	35″	21″	25″	22″	26″	24″	21″	24″	28″	36″	23″	26″
Width rear of machine	52″	58″	28″	32″	38″	42″	40″	38¼″	42½″	42½″	50⅜″		
Number of bars in cylinder	12	12	9	9	12	12	12	12	12	12	12	Shell	Shell
Number of spikes in cylinder	90	99	54	66	76	92	92	54	63	75	99	72	78
Diameter of cylinder including spikes	22″		17½″	17½″	23″	23″	23″	21¾″	21¾″	21¾″	21¾″	22″	22″
Number of bands on cylinder					3	3	3	2	3	3	4	None	None
Speed of cylinder	1125	1125	1300 to 1350	1300 to 1350	1050 to 1150	1050 to 1150	1050 to 1150	1200	1200	1200	1200	950	950
Size cylinder shaft	2⅜″×77″	2⅜″×80½″	1⅝″×46¾″	1⅝″×51″	1¾″	1¾″	1¾″	1¾″	1⅞″	1⅞″	1⅞″	1 5/16″	1 5/16″
Length cylinder shaft bearings					8½″	8½″	8½″	6½″	6½″	6½″	6½″	2¾″	2¾″
Length grate surface					18″	18″	18″	20″	20″	20″	20″		
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	Yes	Yes
Diameter main drive pulley	7½″	7½″	5″	5″	11″	11″	11″	8″	8″	8″	8″	6″	6″
Face main drive pulley	10″	10″	7″	7″	7″	7″	7″	9″	9″	9″	8″	6″	6″
Number of beaters					1	1	1	1	1	1	1		
Length of straw racks	144	144						12′ 8″	12′ 8″	12′ 8″	13′ 2″		
Length of grain bottom and chaffer								12′ 7″	12′ 7″	12′ 7″	13′ 1″		
Rack surface in square feet	52	58						40 1/2	44⅓	44⅓	54 1/6		
Chaffer surface in square feet								7½	8	8	10		
Riddle surface in square feet	15.6	17						10½	12	12	15	19	30
Length separator with S. F. and W. S								26′ 6″	26′ 6″	26′ 6″	29′	11½′	13′
Height of machine at feed table								6′ 6″	6′ 6″	6′ 6″	6′ 6″	5¼′	5¼′
Height of machine at rear								7′ 10″	7′ 10″	7′ 10″	7′ 10″	6′	6′ 2″
Height of front wheels	33″	33″	30″	30″	32″	32″	36″	32″	32″	32″	32″	34″	34″
Width of front wheels	6″	6″	4″	4″				5″	6″	6″	6″	3½″	3½″
Height of rear wheels	36″	36″	36″	36″	41″	41″	36″	36″	36″	36″	36″	34″	34″
Width of rear wheels	6″	6″	4″	4″	4″	4″	5″	5″	5″	5″	5″	3½″	3½″
Track of front wheels C to C					62″	62″	58″	5′ 1″	5′ 10″	5′ 10″	5′ 10″		
Track of rear wheels C to C					62″	64″	73½″	5′ 10″	5′ 10″	5′ 10″	5′ 10″		
Average capacity per hour—Wheat	120 to 150	150 to 200	35 to 45	45 to 60	60	65	70					20 to 30	25 to 40
Average capaclty per hour—Oats					120	130	140					30 to 50	40 to 70
Belt H. P. required with S. F. and W. S					20	25	25					3 to 5	4 to 6
Weight fully equipped	7425	7725	3310	3570	5800	6200	6800	6380	6980	7150	8000	2500	2650

† No. 3 equipped with hand feeder and drag stacker. ‡ With feeder folded back.

TRADE NAME	Gray's Sons—Con'd			Heebner & Sons Pennsylvania		Heebner & Sons Little Giant		Huber					Keck-Gonnerman
Model	No. 265	No. 305	No. 306	No 3	No. 3½	No. 2	No. 1	22″×40″	28″×48″	32″×54″	36″×60″	40″×66″	24″×40″
Width of cylinder	26″	30″	30″	21″	21″	26″	30″	22″	28″	32″	36″	40″	24″
Width rear of machine				28″	33″	33″	37″	42½″	48½″	54½″	60½″	66½″	40″
Number of bars in cylinder	Shell	Shell	Shell	9	9	9	9						12
Number of spikes in cylinder	78	90	90	57	57	75	84	88	112	128	140	156	82
Diameter of cylinder including spikes	22″	22″	22″	25½″	25½″	30½″	34½″	21″	24″	24″	24″	24″	23″
Number of bands on cylinder	None	None	None	1	1	2	2	3	3	5	5	4	3
Speed of cylinder	950	950	950	1050	1050	1050	1050	1100 to 1200	950 to 1050	950 to 1050	950 to 1050	950 to 1050	1050
Size cylinder shaft	1¼″	1¼″	1¼″	1⅛″	1⅛″	1⅛″	1⅛″	1⅞″	2⅜″	2⅜″	2⅜″	2⅜″	1⅛″
Length cylinder shaft bearings	3½″	3½″	3½″	4″	4″	4″	4″	6″	8″	8″	8″	8″	6″
Length grate surface								*10″	*15″	*15″	*15″	*15″	18″
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes	
Diameter main drive pulley	6″	6″	6″	6″	6″	6″	6″	9¾″	9¼″	9¼″	9¼″	9¼″	8″
Face main drive pulley	6″	6″	6″	4″ or 6″	4″ or 6″	4″ or 6″	4″ or 6″	7″	8″	9″	10″	10″	9″
Number of beaters				1	1	1	1	1	2	2	2	2	2
Length of straw racks								10′ 2″	14′ 2″	14′ 2″	14′ 8″	14′ 8″	14″
Length of grain bottom and chaffer								10′ 10″	12′ 8″	12′ 8″	12′ 8″	14′ 8″	14″
Rack surface in square feet								35½	56¾	63¾	73¼	80¾	40″×14′
Chaffer surface in square feet								11¼	13¼	15¼	17¼	19¼	40″×42
Riddle surface in square feet	32	32	38					7⅔	11¼	13	14¾	16½	36¾″×43⅝″
Length separator with S. F. and W. S	13′	13′	14½′					22′ 3″	27′ 6″	27′ 6″	28′ 0″	28′ 0″	20′ 0″
Height of machine at feed table	5¼′	5¼′	5¼′	40½″	40½″	48″	48″	5′ 11″	6′	6′ 3″	6′ 3″	6′ 3″	5′ 0″
Height of machine at rear	6′ 2″	6′ 2″	6′ 4″					8′ 4″	8′ 9″	8′ 11″	9′ 5″	9′ 5″	7′ 6″
Height of front wheels	34″	34″	34″	28″	28″	31″	31″	32″	28″	32″	32″	32″	32″
Width of front wheels	3½″	3½″	3½″	2″	2″	2″	2¼″	4″	6″	8″	8″	10″	4″
Height of rear wheels	34″	34″	34″	36″	36″	39″	39″	40″	40″	40″	40″	40″	34″
Width of rear wheels	3½″	3½″	3½″	2″	2″	2″	2½″	4″	6″	8″	8″	10″	4″
Track of front wheels C to C				5′ 2″	5′ 2″	5′ 8½″	5′ 8½″	4′ 3″	5′ 0″	5′ 8″	6′ 1″	6′ 3″	57″
Track of rear wheels C to C				5′ 2″	5′ 2″	5′ 8½″	5′ 8½″	6′ 7″	7′ 5″	8′ 4″	8′ 10″	9′ 6″	57″
Average capacity per hour—Wheat	35 to 55	40 to 60	50 to 80	15 to 25	20 to 35	30 to 40	40 to 50	75	175	275	375	480	80
Average capacity per hour—Oats	50 to 90	60 to 100	80 to 120	30 to 50	40 to 60	45 to 65	50 to 80	180	315	450	580	720	100
Belt H. P. required with S. F. and W. S	5 to 7	5 to 7	6 to 8	4	4	6	8	20	25	30	35	40	10
Weight fully equipped	2950	3000	3100	2060	2310	2635	3010	4665	7220	7770	8020	8400	7000

TRADE NAME	Keck-Gonnerman—Con'd				Koger			Macdonald Decker Junior		Macdonald Decker		Minneapolis	
Model	30″×48″	32″×52″	36″×56″	36″×60″				24″×46″	28″×46″	32″×50″	36″×54″		
Width of cylinder	30″	32″	36″	36″	16″	20″	30″	24″	28″	32″	36″	24″	28″
Width rear of machine	48″	52″	56″	60″	16″	20″	30″	46″	46″	50″	54″	36″	46″
Number of bars in cylinder	15	15	15	15	12	12	12	12	12	12	16	12	12
Number of spikes in cylinder	130	140	155	155	39	51	75					75	87
Diameter of cylinder including spikes	29″	29″	29″	29″	22″	22″	22″	21″	21″	21″			
Number of bands on cylinder	4	4	4	4	2	3	3	3	3	4	4	4	4
Speed of cylinder	900	900	900	900	250 to 1000	250 to 1000	250 to 1000	1200	1200	1200	900	1200	1200
Size cylinder shaft	2 7/16″	2 7/16″	2 7/16″	2 7/16″	1¼″	1¼″	1 7/16″	2″	2″	2″	2¼″	2¼″	2¼″
Length cylinder shaft bearings	8″	8″	8″	8″	5″	6″	6″	8″	8″	8″	9″		
Length grate surface	20″	20″	20″	20″				10″	10″	10″	24″		
Front concave adjustment	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment					No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Diameter main drive pulley	10″	10″	10″	11″				7½″	7½″	7½″	10″	} Varies with power,	
Face main drive pulley	10″	10″	10″	10″	5″	5″	6″	8½″	8½″	8½″	9″	} speed and pulley.	
Number of beaters	2	2	2	2	None	None	None	1	1	1	1	1	1
Length of straw racks	16″	16″	16″	16″	10′	12′	12′	11′ 0″	11′ 0″	11′ 0″	14′ 0″		
Length of grain bottom and chaffer	16″	16″	16″	16″	5′	7′	7′	11′ 6″	11′ 6″	11′ 6″	14′ 6″		
Rack surface in square feet	48″×16′	52″×16′	56″×16′	60″×16′				38	38	45	67		
Chaffer surface in square feet	48″×42″	52″×42″	56″×42″	60″×42″				13	13	14	18		
Riddle surface in square feet	46¾″×43⅝″	50¾″×43⅝″	57¾″×43⅝″	58¾″×42⅝″	8	10	14	13	13	14	18		
Length separator with S. F. and W. S	22′ 0″	22′ 0″	22′ 0″	22′ 0″				20′	20′	20′	25′	22′	
Height of machine at feed table	5′ 6″	5′ 6″	5′ 6″	5′ 6″	4′ 6″	5′ 0″	5′ 0″	6′	6′	6′	6′ 6″		
Height of machine at rear	8′ 6″	8′ 6″	8′ 6″	8′ 6″	6′ 0″	6′ 6″	6′ 6″	7′	7′	7′	8′		
Height of front wheels	36″	36″	36″	36″	24″	26″	26″	36″	36″	36″	36″		
Width of front wheels	6″	6″	8″	10″	28″	30″	30″	6″	6″	6″	8″	6″	6″
Height of rear wheels	36″	36″	36″	36″	2′	3′	3′	40″	40″	40″	40″		
Width of rear wheels	6″	6″	8″	10″	2″	3″	3″	6″	6″	6″	8″	6″	6″
Track of front wheels C to C	72″	76″	80″	84″	5′ 6″	5′ 6″	5′ 6″	68″	68″	72″	76″		
Track of rear wheels C to C	72″	76″	80″	84″	5′ 6″	5′ 6″	5′ 6″	72″	72″	76″	80″		
Average capacity per hour—Wheat	100	120	130	150	10 to 15	15 to 20	25 to 30	80	100	120	200	} Depends on condi-	
Average capacity per hour—Oats	120	135	150	160	15 to 20	20 to 30	30 to 40	100	125	200	300	} tion, quality, power.	
Belt H. P. required with S. F. and W. S	12	15	18	18 to 20	4	5	6	14	16	20	22		
Weight fully equipped	8500	8800	9000	9500	1200	1800	2500	5200	5300	6000	6400	6200	9500

TRADE NAME	Minneapolis—Con'd			Nichols & Shepard					Orangeville		Port Huron		
Model				Jr	Jr				No. 1	No. 2	20"×34"	22"×38"	28"×46"
Width of cylinder	32"	36"	40"	22"	28"	30"	32"	36"	20"	24"	20"	22"	28"
Width rear of machine	52" and 65"	56" and 62"	62"	36"	40"	46"	52"	60"	28"	34"	34"	38"	46"
Number of bars in cylinder	16	16	16	12	12	16	16	16	9	9	9	12	12
Number of spikes in cylinder	99	111	123	57	72	116	124	128	54	63	51	54	72
Diameter of cylinder including spikes				22"	22"	27½"	27½"	27½"	22½"	22½"	21¼"	23¼"	23¼"
Number of bands on cylinder	4	4	4	3	3	4	4	4	3	3	3	3	3
Speed of cylinder	900	900	900	1150	1150	850	850	850	1200	1200	1200	1100	1100
Size cylinder shaft	2½"	2½"	2½"	1 15/16"	1 15/16"	2 3/16"	2 3/16"	2 3/16"	1⅛"	1¼"	1 9/16"	2 1/16"	2 1/16"
Length cylinder shaft bearings				5"	5"	5¾"	8¼"	8¼"	5"	5"	4½"	7"	7"
Length grate surface				21⅛"	27½"	29⅞"	32"	36⅝"	24"	24"	16"	16"	16"
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	No	Yes	Yes
Diameter main drive pulley	Varies with power, speed and			8½"	8½"	10½"	10½"	10½"	5" or 6"	5" or 6"	7½"	9"	9"
Face main drive pulley	pulley			8"	8"	8"	9"	9"	4"	5"	6½"	8"	10"
Number of beaters	1	1	1	1	1	1	1	1	3	4	2	1	1
Length of straw racks				10' 3"	10' 3"	13' 2"	13' 2"	13' 2"	7'	9'	115"	161"	180"
Length of grain bottom and chaffer				11' 8"	11' 8"	15' 2"	15' 2"	15' 2"	8' 4"	10' 4"	175"	216"	238"
Rack surface in square feet				30¼	33½	58	65⅔	75¾	18	28	27	42⅝	57⅜
Chaffer surface in square feet				10½	11½	17	19	22¾	7	8	8 9/10	11⅝	13 9/10
Riddle surface in square feet				10	11	16	18½	21⅔	7	8	8 9/10	10⅓	12¼
Length separator with S. F. and W. S				27'	27'	31'	31'	31'			19' 7"	25'	27' 3"
Height of machine at feed table				5' 10"	5' 10"	6' 8"	6' 8"	6' 8"	5' 6"	5' 6"	8' 3"	9' 6"	10' 5"
Height of machine at rear				7' 4"	7' 4"	8'	8'	8'	7'	8'	7' 2"	8'	9' 9"
Height of front wheels				32"	32"	38"	38"	38"	24"	24"	24"	29"	32"
Width of front wheels	8"	8" to 10"	10"	6"	6"	6"	8"	10"	2½"	2½"	4"	5"	6"
Height of rear wheels				32"	32"	38"	38"	38"	24"	24"	30"	38"	42"
Width of rear wheels	8"	8" to 10"	10"	6"	6"	6"	8"	10"	2½"	2½"	4"	5"	6"
Track of front wheels C to C				55½"	59½"	65"	71"	81"	60"	60"	48½"	52¼"	59¾"
Track of rear wheels C to C				55½"	59½"	71"	77"	85"	60"	60"	64½"	64¾"	81¾"
Average capacity per hour—Wheat	Depends on condition, quality			60	80	100	120	140	15 to 20	25 to 30	100	150	215
Average capacity per hour—Oats	and power			90	120	150	180	220	30 to 40	50 to 60	150	270	360
Belt H. P. required with S. F. and W. S				24	30	40	50	70	4	5	18	25	32
Weight fully equipped	10500	11600	11900	6000	6550	9000	9700	10800	1865	2275	3600	5600	7765

TRADE NAME	Port Huron—Con'd			Quick & Thomas	Russell						Sawyer-Massey		
Model	33"×54"	36"×60"	40"×64"	Wide Awake	20"×34"	24"×43"	27"×46"	30"×50"	33"×54"	36"×60"	22"×36"	24"×40"	28"×44"
Width of cylinder	33"	36"	40"	33"	20"	24"	27"	30"	33"	36"	22"	24"	28"
Width rear of machine	54"	60"	64"	48"	34"	43"	46"	50"	54"	60"	36"	40"	44"
Number of bars in cylinder	12	12	12	9	15	15	15	15	15	15	12	12	12
Number of spikes in cylinder	87	96	108	84	95	110	120	135	150	160	60	72	78
Diameter of cylinder including spikes	23¼"	23¼"	23¼"	22"	27½"	27½"	27½"	27½"	27½"	27½"	21"	21"	21"
Number of bands on cylinder	4	4	4	3	3	4	4	5	5	5	3	3	3
Speed of cylinder	1100	1100	1100	1200	850 to 900	850 to 900	850 to 900	850 to 900	850 to 900	850 to 900	1140	1140	1140
Size cylinder shaft	2 1/16"	2 1/16"	2 1/16"	2"	2 5/8"	2 5/8"	2 5/8"	2 5/8"	2 5/8"	2 5/8"	1 15/16"	1 15/16"	1 15/16"
Length cylinder shaft bearings	7"	9"	9"	6"	7"	7"	7"	7"	7"	9"	6"	6"	6"
Length grate surface	16"	16"	16"	18"	30"	30"	30"	30"	30"	30"	28"	28"	28"
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Diameter main drive pulley	9"	9"	9"	8"	11"	11"	11"	11"	11"	11"	8"	8"	8"
Face main drive pulley	10"	10"	10"	8"	9"	9"	9"	9"	9"	9"	9"	9"	9"
Number of beaters	1	1	1	8	3	3	3	3	3	3	1	1	1
Length of straw racks	180"	180"	180"	None	13' 3"	13' 3"	13' 3"	15' 4"	15' 4""	15' 4"	126½"	126½"	126½"
Length of grain bottom and chaffer	238"	238"	238"	None	13' 6"	13' 6"	13' 6"	14' 10"	14' 10"	14' 10"	142"	142"	142"
Rack surface in square feet	67⅜	75	80"		37½	47	51	64	69	77	29.8	33.6	36.9
Chaffer surface in square feet	16⅝	18 3/16	19½	16'	8	10	11	12	13½	15	10.39	11.7	13.2
Riddle surface in square feet	15¼	17⅛	18⅓	16'	8	10	11	12	13½	15	9	10.3	11.4
Length separator with S. F. and W. S	27' 3"	27' 3"	27' 3"	25'	25' 4"	25' 4"	25' 4"	28'	28'	28'	26' 3"	26' 3"	26' 3"
Height of machine at feed table	10' 5"	10' 5"	10' 5"	5' 6"	6' 7¼"	6' 7¼"	6' 7¼"	6' 10½"	6' 10½"	6' 10"	82"	82"	82"
Height of machine at rear	9' 9"	9' 9"	9' 9"	7'	8' 2"	8' 2"	8' 2"	8' 4"	8' 4"	8' 4"	82"	82"	82"
Height of front wheels	32"	32"	32"	32	30"	30"	30"	30"	30"	30"	34"	34"	34"
Width of front wheels	6"	10"	10"	4"	6"	6"	6"	6"	8"	8"	4" to 6"	5"	5"
Height of rear wheels	42"	42"	42"	44"	42"	42"	42"	42"	42"	42"	38"	38"	36"
Width of rear wheels	6"	10"	10"	4"	6"	6"	6"	6"	8"	8"	4" to 6"	5"	5"
Track of front wheels C to C	67¾"	73¾"	77¾"	7'	4' 6½"	4' 6½"	4' 6½"	4' 6½"	4' 6½"	4' 6½"	62"	66"	70"
Track of rear wheels C to C	89¾"	95¼"	99¼"	7'	5' 10"	6' 8"	6' 11"	7' 2"	7' 6"	7' 10"	66"	70"	74"
Average capacity per hour—Wheat	240	265	300	90	70	125	175	225	355	450	1000	1250	1500
Average capacity per hour—Oats	400	445	500	100 to 125	115	175	260	310	450	600	1300	1625	1950
Belt H. P. required with S. F. and W. S	40	56	65	12 to 15	24	24	30	40	80	80	22	34	40
Weight fully equipped	8000	8940	9300	6000	7550	8475	8900	9850	10550	10750	5400	5550	5800

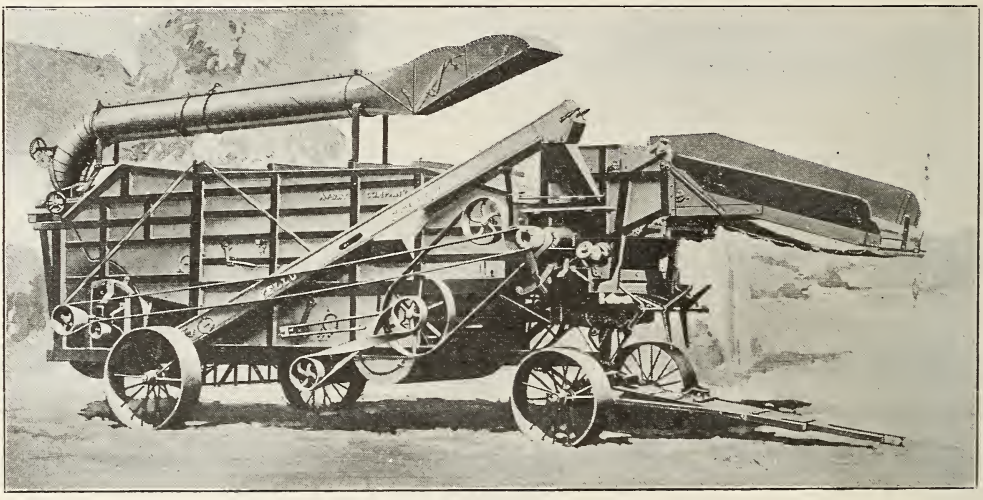
TRADE NAME	Sawyer-Massey	Stewart New Era					Swayne, Robin'n	Waterloo		
Model	32″×56″							24″×36″	28″×42″	33″×45″
Width of cylinder	32″	20″	24″	28″	32″	38″	24″	24″	28″	33″
Width rear of machine	56″	42″	46″	50″	56″	64″	44″	36″	42″	45″
Number of bars in cylinder	16	12	12	12″	16″	16″	15	12	12	12
Number of spikes in cylinder	116	54	66	78″	112	132	100	66	75	90
Diameter of cylinder including spikes	28″	22″	22″	22″	28″	28″	28½″	21⅜″	21⅜″	21⅜″
Number of bands on cylinder	4	3	3	3	4	4	3	3	4	4
Speed of cylinder	865	1200	1200	1200	900	900	850	1200	1200	1200
Size cylinder shaft	2 7/16″	2 3/16″	2 3/16″	2 3/16″	2½″	2½″	2¼″	2″	2″	2″
Length cylinder shaft bearings	7½″	7″	7″	7″	8″	8″	6″	6½″	7½″	
Length grate surface	41″	22″	22″	22″	30″	"30″	30″	18″	18″	18″
Front concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rear concave adjustment	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Diameter main drive pulley	10¾″	8″	8″	8″	10″	10″	10½″	8″	8″	8″
Face main drive pulley	9″	9″	9″	9″	9″	9″	8″	8″	8″	8″
Number of beaters	1	1	1	1	1	1	1	1	1	1
Length of straw racks	122½″	180″	180″	180″	180″	180″	15″	11′	13′	13′
Length of grain bottom and chaffer	142″	168″	168″	168″	168″	168″	16″	9′	11′	11′
Rack surface in square feet	46.2	52⅔	57½	62½	70	80	55	36	46	49
Chaffer surface in square feet	16.63	15⅓	17	18¾	21¼	23	10″	33	42	45
Riddle surface in square feet	15	12¼	15	17¼	18½	20½	11½	10	12	13
Length thresher with S. F. and W. S	27′ 3″	25′	25′	25′	26′	26′	25′ 6″	26′	29′	29′
Height of machine at feed table	72″	6′ 6″	6′ 6″	6′ 6″	6′ 9″	6′ 9″	6′	6′ 6″	6′ 6″	6′ 6″
Height of machine at rear	86″	8′	8′	8′	8′ 3″	8′ 3″	8′ 2″	8′	8′	8′
Height of front wheels	34″	36″	36″	36″	36″	36″	30″	30″	30″	30″
Width of front wheels	8″	8″	8″	8″	10″	10″	6″	6″	6″	6″
Height of rear wheels	38″	40″	40″	40″	40″	40″	36″	38″	38″	38″
Width of rear wheels	8″	8″	8″	8″	10″	10″	6″	6″	6″	6″
Track of front wheels C to C	75″	54″	58″	62″	66″	72″	60″	64″	64″	64″
Track of rear wheels C to C	94″	78″	82″	86″	92″	100″	81″	77″	77″	77″
Average capacity per hour—Wheat	2000	80	100	120	150	200	800	100	125	150
Average capacity per hour—Oats	2600	150	175	200	250	300	1100	150	175	200
Belt H. P. required with S. F. and W. S	50	15	18	20	22	25	25 to 28	20	24	28
Weight fully equipped	8200	5500	6000	6500	7300	8000	7500	5800	7000	7100

TRADE NAME	Waterloo—Con'd		White Challenge						Wood Bros.	
Model	36″×48″	33″×52″							Individual	
Width of cylinder	36″	33″	20″	24″	28″	32″	36″	36″	20″	
Width rear of machine	48″	52″	36″	40″	46″	54″	50″	60″	36″	
Number of bars in cylinder	12	16	12	12	12	16	12	12	12	
Number of spikes in cylinder	99	116	54	60	72	108	96	96	63	
Diameter of cylinder includidg spikes	21⅜″		22½″	22½″	22½″	28	22½″	22½″	24¾″	
Number of bands on cylinder	4	4							3	
Speed of cylinder	1200	800							1100	
Size cylinder shaft	2″	2¼″	1 15/16″	1 15/16″	1 15/16″	2 7/16″	2 7/16″	2 7/16″	1 15/16″	
Length cylinder shaft bearings			8″	8″	8″	10″	9″	9″	5″	
Length grate surface									42″	
Front concave adjustment	Yes	Yes							Yes	
Rear concave adjustment	No	No							No	
Diameter main drive pulley	8″	12″							10″	
Face main drive pulley	8″	8″							8″	
Number of beaters	1	1							None	
Length of straw racks	13′	12′	9′ 8″	14′ 3″	15′ 7″	15′ 7″	15′ 7″	15′ 7″	9′ 7″	
Length of grain bottom and chaffer	11′	11′	10′ 9″	15′ 4″	15′ 4″	15′ 4″	15′ 4″	15′ 4″	9′ 5″	
Rack surface in square feet	52	56	29	47	57	69	64¾	77½	27	
Chaffer surface in square feet	48	51	15½	17	19	23¼	21½	25	15½	
Riddle surface in square feet	14	15	10	11⅓	12½	15½	14⅓	17	7½	
Length separator with S. F. and W. S	29′	29′	22′ 2″	24′ 6″	25′ 4″	25′ 4″	25′ 8″	26′	26′	
Height of machine at feed table	6′ 6″	6′ 6″	4′ 2″	4′ 9″	5′	5′ 2″	5′		5′	
Height of machine at rear	8′	8′	7′ 3″	7′ 6″	8′ 2″	8′ 4″	8′		7′	
Height of front wheels	30″	30″	32″	32″	32″	32″	32″	32″	30″	
Width of front wheels	8″	8″							4″	
Height of rear wheels	38″	38″	38″	38″	38″	38″	38″	38″	30″	
Width of rear wheels	8″	8″	4″ to 12″	4″ to 12″	4″ to 12″	4″ to 12″	4″ to 12″	4″ to 12″	4″	
Track of front wheels C to C	65″	65″							38″	
Track of rear wheels C to C	79″	79″							62″	
Average capacity per hour—Wheat	175	200							75	
Average capacity per hour—Oats	250	300							150	
Belt H. P. required with S. F. and W. S	30	40							10 to 20	
Weight fully equipped	7400	8300							4900	

THE THRESHING MACHINE

BY TOM B. WALKER.

Threshing is the operation of separating grain or seed from the stalk upon which it grew. This has been accomplished in various ages and in various countries by different means, more or less effective. The first method known was the beating out of the grain with a stick. An improvement on this was the practice of the ancients of spreading the loosened bundles of grain on a piece of hard ground and driving oxen or other animals over it, so as to tread the grains out of the heads; but, as this was found to damage some of the grain, it was partially superseded in later times by the threshing sledge, a heavy frame mounted on rollers.



Typical Wooden Thresher.

The threshing sledge is still to be seen in operation in Greece, Asia Minor and Syria.

The primitive implement of northern Europe was the stick, and an improvement upon this method, the flail. This consisted in many cases of two sticks of different lengths fastened together by stout thongs, and is still in use in parts of Europe.

Early, but unsuccessful, inventions to supersede the flail by a machine, both in Europe and America, were largely of the rotary beater or flail type, as was that devised by Menzie in 1750.

In 1786, however, Andrew Meikle, an ingenious Scotch mechanic, produced a threshing machine so perfect that, despite nearly a century of improvements, it is essentially the machine of its inventor. Meikle's method of using two grooved cylinders, however, has been almost entirely superseded in modern machines by a high speed cylinder with radial teeth playing between inwardly projecting teeth set in a bar or concave.

The first machine simply threshed the grain from the straw and heads, the cleaning being done later by various methods. The bundles were fed into the machine by hand, and the bands used in tying them were also cut by hand. The straw was simply dumped out on the ground by the machine and stacked by hand or hauled away as desired.

One of the first improvements was the building of a fanning mill in the machine, which permitted the cleaning of the grain as it passed through the machine. Then followed closely the straw carrier or elevator which, by means of a raddle, elevated the straw convenient for stacking and kept it away from the machine. This was soon followed by the pneumatic stacker, self-feeder, weigher and bagger.

The pneumatic stacker, or wind stacker, as it is commonly called, elevates the straw, as its name implies, by means of a built-in fan running at a high rate of speed, which permits stacking the straw without manual labor, delivering it through a chute at the end of which is a hood which is manipulated by a rope, thereby diverting the straw in any direction desired. This was a great improvement.

The self-feeder was also developed at about this same time. The bundles are deposited on a raddle which carries them toward the cylinder of the machine. As the bundles pass the bands which bind them are automatically cut by knives and the loosened bundles are then fed into the cylinder. Then came the weigher and bagger, which conveyed the threshed and cleaned grain from the machine, elevated it to the top of the machine for weighing and delivered it either into the sack, bin or wagon, as desired.

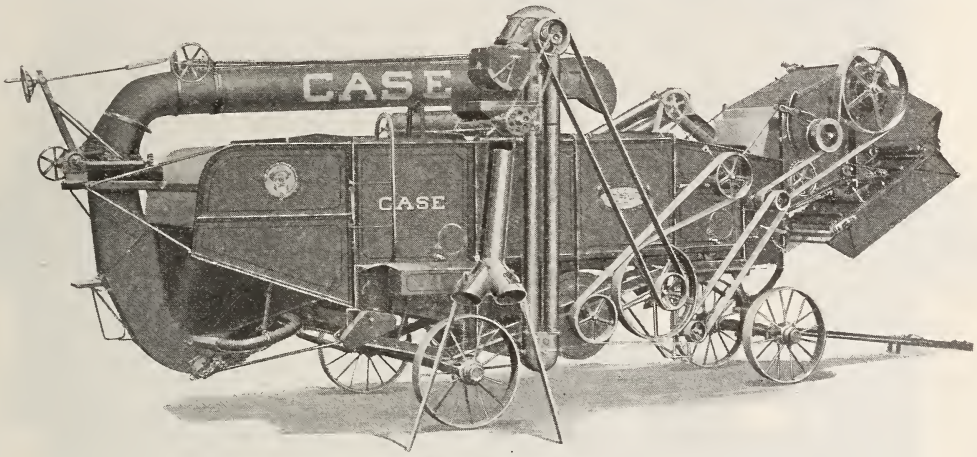
The development of the threshing machine is therefore very interesting. From the time when the ancients knocked out grain with a stick to the pres-

ent machine, which cuts the bands binding the bundles, feeds the grain into the cylinder, threshes the grain from the head, separates the grain from the straw, blows the straw as desired by the operator and delivers the cleaned grain ready for the market, is a big step in civilization and a boon to mankind.

Manufacturing—From Factory to Owner

The manufacturing of threshers has become one of the large industries. In the United States alone the investment in manufacturing plants for the construction of threshing machinery runs well into millions, and the men employed in those plants are numbered by thousands.

In construction, the various types of threshing machines vary but little so far as general appearance is concerned, but the inner construction differs



Typical Steel Thresher.

somewhat in all makes. This difference in construction will be taken up later.

The shipping facilities of these manufacturing plants are of the best, some of them being located on four or five different railroads, making possible more rapid handling of freight, which competition naturally affords. Practically all plants are equipped with large loading cranes with sufficient power that the lifting of the largest size thresher, or even steam engine, is made possible. They place the thresher on the car, the loading crew securely blocks it, and it is ready for its journey to the purchaser. If for export shipment, the machine is securely boxed, as is required for such transportation.

Upon the arrival of the car with the thresher at the destination specified by the purchaser, it sometimes presents to him quite a problem, for the unloading of a large thresher cannot be looked upon as a trivial job.

There are some things, however, that the new owner of the thresher wants to see to before he unloads the machine. All boxes packed with fixtures should be checked carefully to see that nothing has been stolen or lost in transit; all belts should be checked over to see that they are not cut nor stolen, for leather belting is very expensive and quite subject to theft; in fact, the whole car should be checked to see that it tallies with the bill of lading. If there are any shortages or losses apparent, the purchaser should see that the railroad agent makes such notation on the freight bill so that a claim may be presented and recovery made for the amount lost. This routine will materially reduce disputes between purchaser and manufacturer.

When these notations are made, if such are necessary, it is perfectly safe and proper that the machine be unloaded without delay. Most small towns are favored by the railroad company with an unloading dock, either for side or end delivery. In either case it is a simple matter to knock the blocking from the wheels and run the machine down the slip. If a block and tackle be obtainable, the task is still simpler. It is when the car is spotted at some siding where no unloading platform is obtainable that the purchaser may have difficulty.

The railroad company must and will furnish unloading material with which to build up a temporary unloading dock, and this is best done with ties and planks. The building of this slip is quite simple. The first ties are laid at right angle to the rails, and the next tier parallel to the rails, and this construction is followed until the ties are within approximately four inches of the deck of the car; then planks are laid on top of this formation, single for small machines, and double for the large, parallel with the rails, and the machine let down the incline. As stated above, a block and tackle is of great assistance in doing this, although a rope snubbed on some solid object is equally efficient.

The car upon which the thresher is loaded should be well blocked and the brake set.

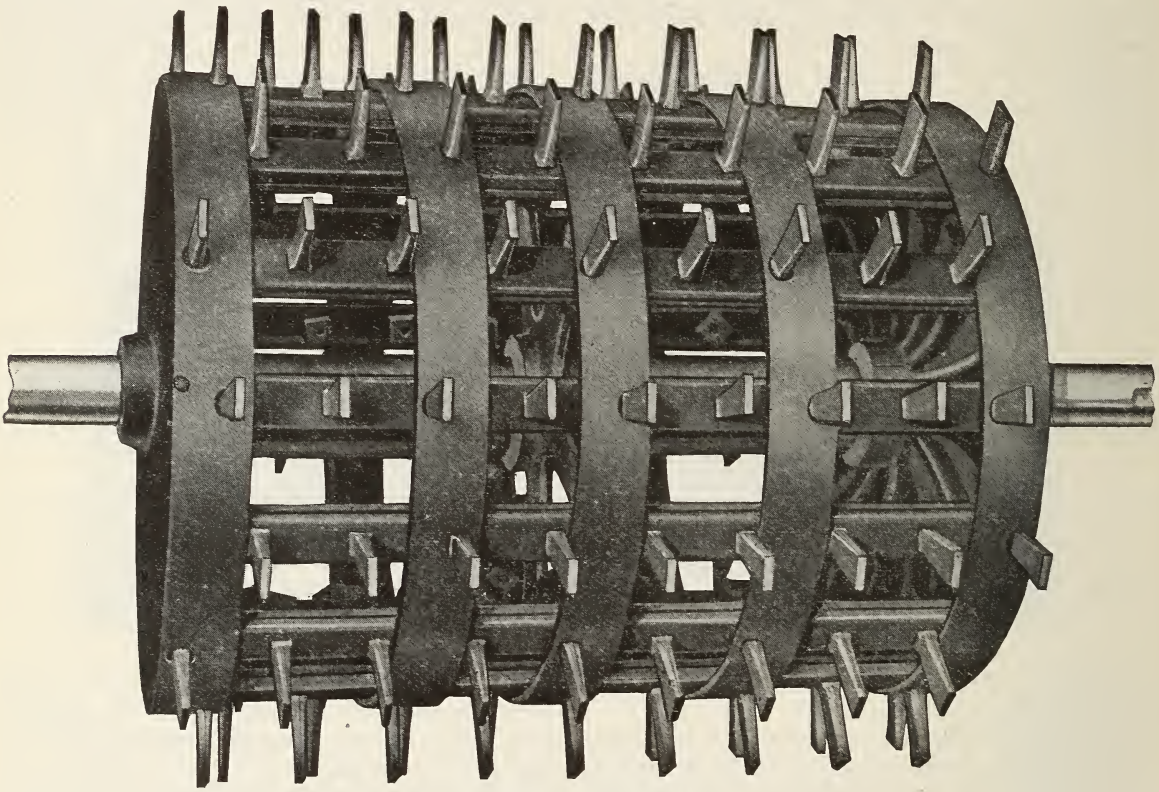
Owing to the fact that the threshing business is very seasonal, and the shipping therefore congested, it is sometimes necessary to ship some of the ma-

chines without taking the time to attach the feeder and weigher. Ordinarily the feeder will be placed on top of the thresher and the weigher on the floor of the car.

If there is a tripod with a block and tackle or chain hoist available, the problem of putting on the feeder is simple indeed, as it is practically impossible to attach it incorrectly. It will only fit the machine one way, and that is the right way. However, if there are no such conveniences, there are other ways possible. The most simple is to turn the feeder upside down on top of the thresher (it is generally shipped in this manner), with the end that is to be attached to the machine toward the front of the thresher, which is the cylinder end, move it up until the ends of the sills of the feeder come even with the frame of the machine, then attach a rope to the feeder to hold it rigid and turn it over. It will come into its correct position in this way with a minimum of manual labor and can then be securely attached with the bolts provided for the purpose.

The next thing in order is to put on the weigher and bagger. Some manufacturers build their weighers, but most of them use a standard make manufactured by a company specializing in such equipment. These weighers are standard in every respect and practically the only change made for the different makes of machines is the boot where the weigher is attached to the grain auger of the thresher. These boots are packed in the fitting box. Directions for fitting up the sprockets and chains are given on a printed list, which is also always packed in the fitting box, and with these instructions every man with a very little mechanical knowledge can attach the weigher with little or no trouble at all.

With the feeder and weigher attached, the heavy work is done and the machine is ready to be pulled into the shed, which always should be provided, until the time arrives for the beginning of the threshing season.



The Thresher Cylinder.

The machine is not yet ready to thresh by any means, as there is much work to be done before it is wise to start feeding bundles into the feeder. The first thing to be looked after is the cleaning out of all oil holes. In shipping and in hauling home many of these holes will become filled with cinders and dust, and they should be thoroughly cleaned before a wheel is turned. All grease cups should be filled with grease and screwed down until the grease comes out along the shaft it is to lubricate, and then refilled for future use.

The next step is to belt up the entire machine. Leather belts should run with the smooth or hair side to the pulley. Printed instructions are sent with all machines, showing just how to belt them up, but if they should become lost, good judgment must be used. As all machines belt differently, ow-

ing to the different systems of separation, it is impossible to give all instructions along this line here. Make sure that none of the machinery in the thresher is running backwards and you are safe. This may sound absurd, but the natural movement of the straw and grain is toward the rear of the thresher, and if any of the mechanism is working contrary to this plan, trouble will result. This point must be watched by the new operator. There is one exception to this rule, which is a machine containing a distributing beater. This runs just the reverse of the balance of the machinery, dividing the straw and spreading it over the racks. Always see that a straight belt is not used where a crossed belt is specified, and vice versa.

When the machine is belted up completely, line up the engine, put on the main drive belt and start the machine very slowly, watching to see that everything is running smoothly. Go over the machine now and oil it up. It is a very good idea to run the thresher empty for an hour or two before feeding any grain into it. This will enable the new operator to see that no hot boxes develop, that the cylinder spikes are not striking those in the concaves, that the pulleys are lined up properly, so that none of the belts are getting chafed against any part of the machine, and that the whole machine is running smoothly. It is much easier to regulate these things on an empty machine than it is to have the machine in operation threshing and not be able to keep a close check on its operation. Better a little delay than to spoil some part and be idle awaiting the repair thereof by an experienced man, which would be required at this juncture.

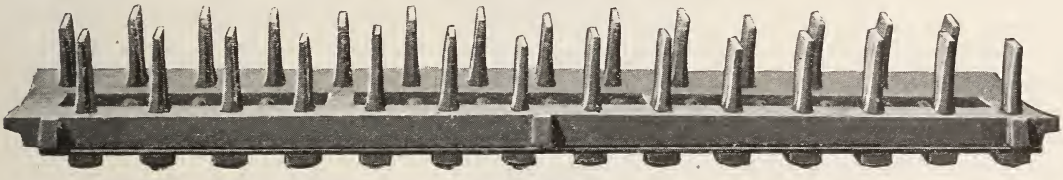
Operation Data

Theoretically of course the modern thresher should save each and every grain, but many conditions obtain which make this impossible. These points will be discussed later on.

The ideal self-feeder is one that will deliver the bundles of grain to the cylinder in a steady flow, all bundles properly cut.

The cylinders of the modern machines are very sturdy, as may be noticed from the cut. Practically all manufacturers confine their efforts to three different cylinder diameters, these being the twelve-bar, fifteen-bar and twenty-bar, each having its advantages and disadvantages, as is the case in every mechanical detail. These bars are double in nearly all cases, securely fastened to cast iron heads, which are in turn keyed to the cylinder shaft and the whole bound together with from three to five heavy iron bands. The development of the spikes, which are inserted into the bars, has also been noteworthy. Formerly these were made out of light weight iron, but today they are made of high grade heat treated steel, tempered on the wearing edge, making them very durable.

The concaves are the most standardized part of a thresher today, there being but little or no difference in their construction. The concave's purpose in the thresher is simply to hold the spikes through which the spikes of the cylinder play. They are held in place by hangers, and the whole suspended on eccentrics, which permits of the entire unit being adjusted to or from the cylinder, as the conditions may require, which will be discussed later. Practically all machines are constructed so that this unit is adjustable in the front, and a few are adjustable both from the front and rear of the concave unit. The cut below is that of a modern concave filled with teeth. The concave is made of cast iron, and the spikes are usually of cheaper material than that used in the cylinder spikes. There is a reason for this, viz., that should any foreign substance get into the cylinder with the grain, such as a wrench, fork, etc., these concave spikes will break rather than those in the cylinder, and it is a much simpler process to put spikes in the concaves than in the cylinder, as a comparison of the construction will indicate. The concaves slide out of their hanger with a minimum of labor.



A Concave Section.

Beaters are a very important part of the modern thresher. Practically every make of machine is equipped with a beater just back of the cylinder, the purpose of which is to clean the cylinder and prevent thereby the grain following around it, which is the natural tendency. Some machines are equipped with an additional beater for spreading the straw over the racks, the theory being that this thins the straw and enables the grain to fall to the grain pan with much less obstruction. A few machines have even a third beater. The beaters are, of course, but a mechanical application of the principle of beating the grain with sticks or flails as the ancients did.

The straw racks of a thresher may be classed as the mechanical means by which the straw is moved from the cylinder through the machine to the wind

stacker. However, they serve more than the above mentioned purpose, as they are slatted racks with openings between the slats, through which the threshed grain is permitted to fall down to the grain pan, which conveys the grain to the shoe or cleaning mill. Every modern machine has straw racks of some kind, although it has not been long since that a machine was built which conveyed the straw to the rear by means of a canvas conveyor, but this machine has been discontinued. The racks in the present-day machines vary so much that a thorough discussion of them in this article would be prohibitive, but this much may be said upon the subject. Styles may be grouped thus: One rack, two racks, multiple racks, and rotary. The former, as the name indicates, is equipped with one rack reaching the entire length of the thresher. The two rack principle, in fact, is but an elaboration of the one rack machine. The first rack is similar to the one rack machine, but shorter; the second rack makes up the length of rack surface, usually runs faster than the one in front of it, the idea being to thin the straw again so it will offer less obstruction to the separation of the kernels of grain. The multiple rack machine may consist of three or more narrow racks, placed parallel to each other and operating at different degrees so as to give an alternating motion. The rotary rack principle is different from any of the above described methods in that it consists of a series of fingers attached to a shaft rotating toward the rear of the machine. These rotating shafts and fingers are placed adjacent to each other from the front to the rear and the straw passes over the top. The whole idea of all of them, however, is to work the straw to the rear, and at the same time agitate the straw so as to shake the loose grain out of it. In some machines fingers are attached to a shaft which turns approximately a quarter circle only, and additional agitation given to the straw in this manner.

The shoe of a thresher is merely the fanning mill arrangement which permits the grain to be thoroughly cleaned. It consists of a series of sieves. The movement of the shoe in most cases is similar to the movement of the straw racks, and such are called "end shake" shoes. Others are operated at right angles to the above movement and are called "side shake" shoes. The material difference is slight. The air blast is applied to the sieves differently, also. Probably the greater number of machines is equipped with what is called the "undershot" fan; that is, the wind is blown up from under the sieves, lifting the chaff and light straw off the sieves and into the stacker. The other type is called the "over-shot" fan, and the principle there is to blow the chaff and dirt off the top of the sieves into the stacker. The difference in principle is quite apparent.

The wind stacker is another standardized article on a thresher, being all built under a special patent held by one concern. The principle is quite simple now that it is worked out. There is a high speed fan rotating in a housing and the straw is simply blown from the machine through a chute, any place the operator might will, within a radius of 50 feet from the machine.

The Contrast Between Theory and Practice in Threshing Grain

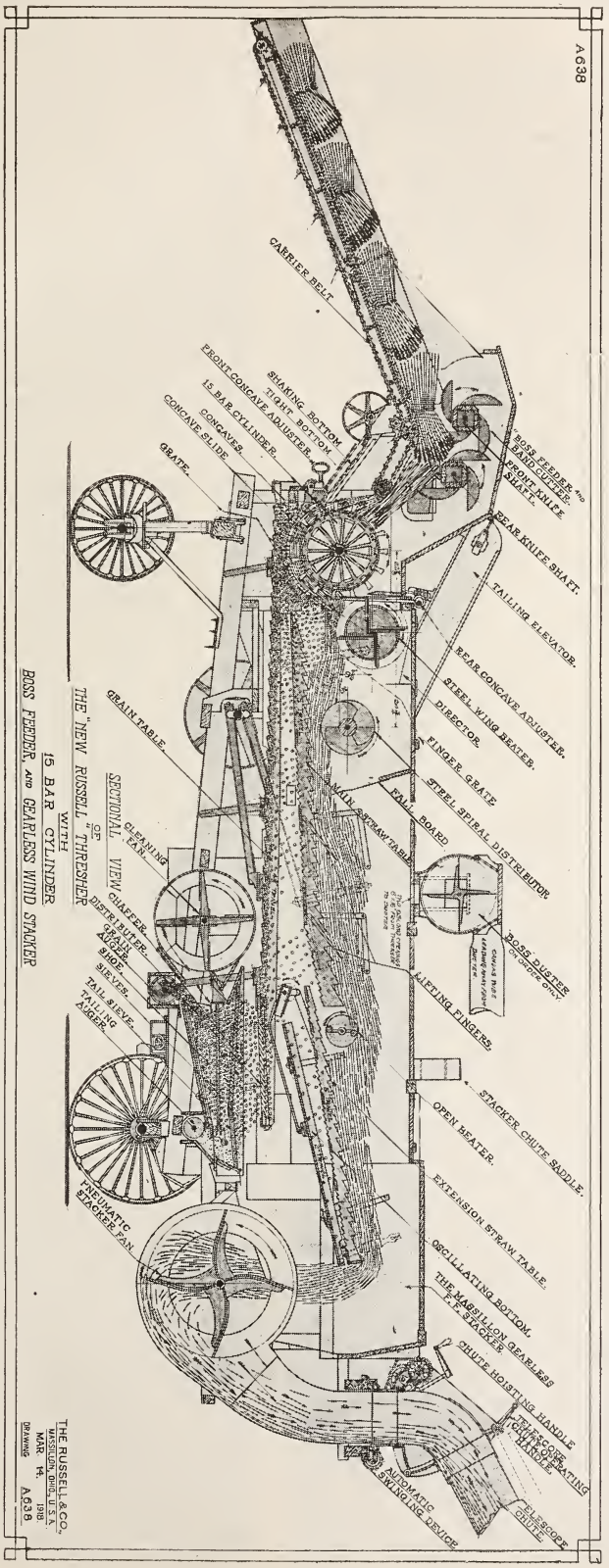
Theoretically, as stated before in this article, a machine should save all of the grain.

Practically, as it has been found by the experts of the U. S. government, this is far from true. They allow, as being within the bounds of reason, three-quarters of one per cent waste. However, due to careless and inefficient operation of threshing machines, tremendous losses occur every year. Capt. K. D. Hequembourg, chief of the grain threshing division of the Food Administration of the U. S., was in charge of a grain-saving campaign during 1918, and his findings are of great interest. "Thresh-ermen's assistants," under his direction, visited the machines of thirty-two states, making blanket test campaigns. In these states the various Federal Food Administrators estimated a saving of approximately 32,000,000 bushels of wheat alone, to say nothing of the other grains saved. When this fact is considered it is highly important that the thresherman knows more about how to operate his thresher.

Inefficiency—Its Causes

While the designs of the different machines built in this country are quite similar, yet certain refinements make the work of doing a good clean job of threshing an accomplishment not so difficult of attainment. The purchaser should see that his machine is built by a good, substantial company, which will back up its output. There are a number of such companies, and their product will do good, honest work, with proper care and attention on the part of the operator.

The question of power is quite an important one. While this is a little foreign to the subject, it cannot be detached from it. A lack of power in the engine which is operating the thresher will result disastrously when the question of efficiency is considered. The separator cylinder speed will not be kept up to that specified by the manufacturer, and as this is carefully figured out, that speed must be maintained. The lowering of speed means that the cylinder cannot properly knock the kernels from the heads of grain. It also means that the entire machine will be running below speed. This results in insufficient agitation of the straw contained therein and the grain rides over the racks into the wind stacker and is wasted. Insufficient power causes much waste, not only as above mentioned, but from the fact that the engine has not the capacity to operate the thresher at an even load. This results in uneven feeding to favor the engine, and uneven



Sectional View of Typical Thresher Showing Movement of Grain and Straw from Feeder to Stacker.

feeding is very detrimental to efficiency, as will be shown later on. An excess of power is always advisable.

Different grain conditions not noted by the operator cause much waste. It might be assumed that, taking wheat for example, if the machine be set in the early morning for doing good work, it is good all day with that adjustment, but this is untrue. Grain ofttimes is damp with dew in the morning, drying off later on in the day and requiring different handling to save it. Then many adjacent fields of the same variety of grain thresh in a considerably different manner. This may be due to the time of planting, the type of soil, care of soil, etc., but the fact remains that there is much difference, and the careful operator will take note of the kind of work he is doing on each new job.

Now, when it comes to the care and adjustment of the machine itself, the problem is more complex. This is treated quite thoroughly in the next subject.

Suggestive Data

Suggestions will be made in the following order: Feeding, feeder, speed of cylinder, speed of machine, spikes, belts, shoe, damp or tough grain, very dry grain, cracked grain and wind stacker.

The proper feeding of a machine is very important and much grain is wasted by improper methods being used. All bundles should be placed in the feeder with the heads toward the cylinder, each bundle over-lapping the one just ahead of it. Do not feed the butts of the bundles toward the machine nor place the bundles in the feeder cross-wise. Both of the latter methods will result in poor separator operation, for the heads should strike the cylinder first so that the cylinder gets an unobstructed opportunity to beat the grain from the heads. Feeding the bundles cross-wise will cause the cylinder to slow down, owing to the greater power required to pull in the straw in that position, which is very evident. Also, only a few spikes get an opportunity to work on the heads, as the latter are only going into the cylinder at one spot rather than over the entire width of it. The improper feeding of a thresher, which is very easily regulated, is one of the most common causes in the wasting of grain.

Every feeder is set so that it will not feed the machine until the cylinder reaches approximately its normal speed. This is possible owing to the action of a governor which does not engage until the proper momentum is reached. The reason for this is that, without such an arrangement, bundles would be fed into the cylinder before the proper time, and this is simply a precautionary measure to prevent premature feeding, which the manufacturers realize the necessity of avoiding. Keep all band knives very sharp. A thresher will do poor work with dull band knives for the reason that the bundles are pulled into the machine by the cylinder in their entirety, without the distribution obtainable with the bundle properly cut. The action of the cylinder is perfectly normal in this case, for when it takes part of the bundle in there is nothing to prevent its taking all of it, as is the case when the bundle is cut and the knives have an opportunity to work through the straw. When the grain goes into the machine in one large bunch, as is the case in this instance, sufficient time is not given to thresh out the kernels from the heads at the cylinder and the straw is bunched up too much to permit separation of the grain from it after it leaves the cylinder. Keep the band knives sharp always.

Normal speed of the cylinder as specified by the manufacturer should be maintained at all times. This is carefully figured out according to the diameter of the cylinder, so that a rim speed is maintained which experience has taught is proper. Too high speed of the cylinder will result in severe strains on the balance of the machine, as the entire mechanism of a thresher is driven from the cylinder shaft. Too low speed will result in very poor work, as the action of the machine will become sluggish and it will not take care of the straw. There will not be enough agitation to dislodge the threshed grain from the straw, and the cylinder will not properly knock the kernels from the heads. The operator should know the speed at which his machine should run and see that it runs at that speed. Therefore the speed of the machine being dependent upon the speed of the cylinder shaft, the two are linked together inseparably and the lowering or raising of the speed of the cylinder affects the entire machine. Subnormal speed is caused by several things: Slippage of the drive belt from the engine; subnormal speed of engine due to lack of power, low steam pressure, or governors improperly set; too large pulley on the thresher. Excessive speed may be due to excessive speed of engine or too small a pulley on the thresher. Corrective measures are easy in each case.

When the thresher cylinder shows a tendency to refuse to take in the bundles properly, the cause very often is found to be dull cylinder spikes, and these should be replaced at once. In case new spikes are not at hand, a few spikes reversed in the cylinder will serve the purpose temporarily; that is, with the curve of the spikes toward the front of the cylinder instead of the back. Very often heads of grain may be found going into the stacker and being threshed out there, and this is traced in some cases to the fact that the spikes in the cylinder and concaves are badly worn, permitting the heads to pass through without being torn to shreds.

When the question of belts is mentioned, the cause for much separator trouble is located. Belts stretch beyond the point of patience, but they must be kept tight at all times. The speed of the cylinder, therefore, is not a sufficient indication as to the speed of the balance of the machine. The cylinder may be running at its proper speed and still the

racks and the balance of the machine may be running below speed due to belt slippage. The thresher may plug up with straw at times and this condition is directly caused by the cylinder delivering the normal amount of grain into it and the racks being unable to take it away therefrom, due to belt slippage. In fact, many of the troubles of the thresherman are due to this fact, and in case of trouble it is well at all times to look for the loose belt. Keep all belts tight all the time.

The shoe is the fanning mill of the thresher. It is at this point that the grain is cleaned, and it is one of the vital points of the thresher. Keep the fan belt tight. If an adjustable sieve is used, govern the opening of the lips by the manner in which the chaff and straw are being blown from it. If grain is going over with the litter, cut down the opening until it stops, or cut down the windboard opening at the fanning mill until the same result is obtained. If much dirt, in the way of short straw, "cobs," or parts of the wheat head, is going into the grain as it comes from the machine, the reverse action is necessary; that is, the sieve must be opened until the refuse is lifted from the grain. Care must be used in this operation, however, for there is much light grain that has the same weight as the small "cobs," and this grain will go into the wind stacker with them. A thresher is not human, and the wind has but the weight of the particles by which to make its distinction between what is grain and what is refuse. Ordinarily, however, the operator is able, with a little experience, to correct successfully the waste at this point.

Damp or tough grain presents quite a problem to the uninitiated. It is very difficult to get the kernels out of the heads, due to its very dampness and toughness. In such cases more concave spikes will need to be added. This will, of course, cause the machine to run much harder, and this will be indicated very promptly by the engine. Care must be used not to overfeed the machine at this time, for the same capacity cannot be obtained in tough grain that is possible when the grain is dry and in good condition. There are times when the concaves may be drawn up closer to the cylinder, thereby closing the throat of the machine and getting all the kernels off the head, but in bad cases the addition of concaves with additional rows of spikes is necessary.

The handling of very dry grain is not quite such a problem. However, occasions arise at times which require immediate action. The chief trouble encountered with dry grain will be that of loading up the shoe and racks with chaff and very short, chopped-up straw, making it difficult for the machine to handle it. Lower the concaves as the first step. If this does not stop the trouble, take out all but a very few concave spikes. If with these few concave spikes the grain is all knocked from the head and the loading-up condition still exists, extreme measures must be taken and all the concave spikes removed. This will stop the cutting up of the straw and eliminate the trouble. This very dry condition obtains in very few localities.

Cracked grain is also a local condition, found only when the grain is very dry. It may even be necessary in such cases to replace the iron concaves with wood, although it is very seldom that conditions become so bad as this. End play of the cylinder will cause cracking of grain as well, and this is remedied by setting up the boxes against the cylinder so that this play is eliminated. The cylinder boxes of all machines are made adjustable at this point.

Many troubles start at the wind stacker; that is, they are found there and in the stack. Many times grain is threshed in the stacker fan and the patter of wheat in the wind stacker chute is common. There are several ways to trace the trouble. Taking the hardest condition to correct first, wheat heads are found going over the racks into the stacker with the straw. This indicates at once that the cylinder is not knocking the kernels from the heads and corrective measures must be taken. The cylinder spikes may be worn down, and as suggested before, this condition can be eliminated by renewal. When this does not correct the trouble, the concaves may be drawn up closer to the cylinder, and if this does not do it, one must add more concave spikes. This should remedy that trouble.

When bare kernels are found coming over with the straw, the indications are that the cylinder is knocking them out, but the machine is not saving them. This condition will obtain in long straw, and the more beaters or agitators the thresher has the better it will handle this situation. The solution, if this condition does exist, is to adjust the concaves closer to the cylinder in mild cases, or put more spikes in the concaves in severe cases. The idea is simply to cut up the straw so that it will not form a mat that the threshed grain cannot get through.

In conclusion, it might be added that the science of properly operating a thresher cannot be learned in a day, and operators of engines are much more easily found today than good, reliable separator men. All manufacturers and most owners will testify to this. Experience is the best teacher, of course, but the suggestions given above may be of considerable assistance.

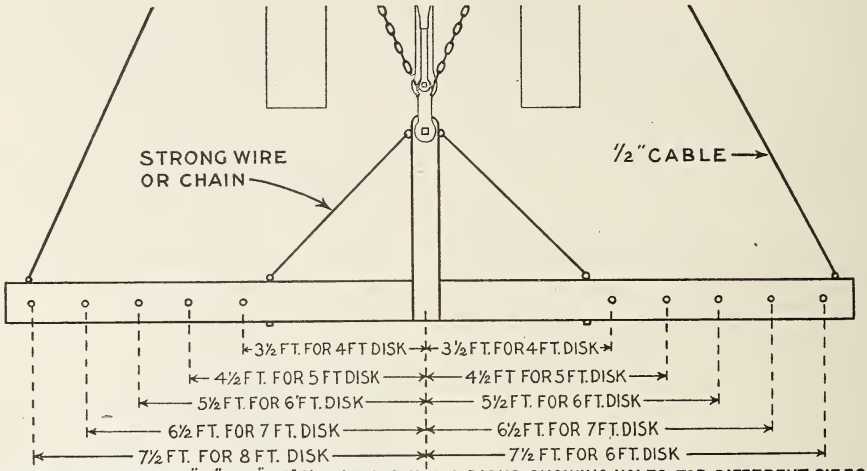
The modern thresher is becoming a highly efficient product. Some are being built almost entirely of steel. Wind stackers are now constructed with a sieve in the bottom to save the grain which may get into that part of the machine. This may make the work of the operator less important, if such an end can be accomplished without his getting careless. Machines are also appearing on the market equipped with roller and ball bearings, which might be called the height of mechanical perfection in threshing machine construction. Whether or not such construction will become standard remains to

be seen, as it is a new idea as applied to thresher building.

While the world war might have been won without the aid of many kinds of machinery, it absolutely would have been lost had it been necessary to have done without the modern thresher. As the modern thresher is able to thresh ready for the market in the neighborhood of 4,000 bushels of wheat a day, can one imagine the army of men which would be required to flail out the same amount? The grain thresher of today is one of the most essential pieces of machinery within the power of mankind to obtain.

SIMPLE TRACTOR HITCHES

Except for the tractor plow and the tractor disk harrow, most of the machines used on present-day farms were designed to be drawn by horses. The use of a tractor with machines so designed usually requires some adjustments which, while comparatively simple, are unusual. In this article we shall try to show the best and simplest methods yet devised of applying the power of the light farm tractor to the horse-drawn machines the farmer now owns and uses.



FLOATING DRAWBAR 2"X8" OR 2"X12" HARDWOOD FOR 3 DISKS SHOWING HOLES FOR DIFFERENT SIZES

Fig. 1.

There is no particular trouble in applying tractor power to single machines, whether disks, binders, spreaders, hay loaders, etc., but there is little economy in using the power of eight or ten horses to draw these machines singly. In cases where a tractor is used to draw only one machine, an ordinary stub pole hitch is usually all that is required. In the case of the disk harrow, the hitch should be flexible and long enough to permit the tractor to drop down into a depression without throwing that extra weight on the forecarriage of the harrow. Where no such flexible hitch is used it is best to remove the forecarriage, since it is unnecessary when the tractor is used to draw a disk. It is only in cases where more than a single unit of these various types of implements is used behind a single tractor that some special hitch is necessary.

A General Utility Draw-Bar.

With a draw-bar such as is illustrated in Fig. 1, tractor owners will find that they can draw two or more farm implements behind a tractor without complicated hitches. This general purpose draw-bar, which is simple and easy to make, meets practically all the requirements of the different farm machines. For the construction of such a hitch select a good piece of hardwood timber of a size that will stand the total amount of strain coming from the different combinations of machines that are to be used behind it. Usually a 2x8, 2x12 or 4x4 hardwood timber is strong enough for the purpose. The length is indicated by the number of machines which the farmer wishes to use at any one time, which depends largely of course upon the capacity of the tractor. The stub pole used in making this general purpose draw-bar can be of the same material and should be from 3 to 4 feet long, bolted securely to the draw-bar and braced against side strains by means of angle irons or heavy cables. These braces should not extend too far out along the draw-bar. If they are attached more than 3 feet from the center, they are likely to interfere with the drive wheels of the tractor on short turns. The end of the stub tongue should have a strap iron reinforcement with a hole bored for coupling it to the tractor by means of a clevis. Long clevises should be used in the holes bored in the draw-bar for the attachment of the different machines to be used. It is a good plan to place a forecarriage or tongue truck beneath the stub tongue of a long draw-bar like this to prevent see-sawing of the machines at-

tached to it. Also for special purposes, such as loading hay with two wagons and loaders at one time, caster wheels placed beneath each end of the draw-bar or ordinary low wheels with stub axle, bolted

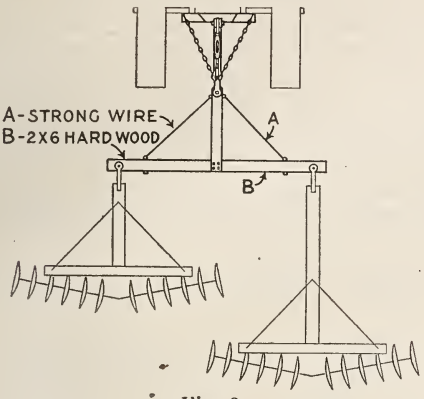


Fig. 2.

to each end, will be found an advantage, as they will support the poles of the wagons and prevent them from running foul with the ground.

Hitch for Two Disk Harrows.

In Fig. 2 the general purpose hitch just described is shown being used with two disk harrows. Note that the two poles attaching the disk harrow to the draw-bar are of different lengths in order that the necessary 6 inches of lap can be obtained to make a good job of disking. Providing the tractor has the power, an excellent combination can be made by attaching sections of smoothing harrow behind

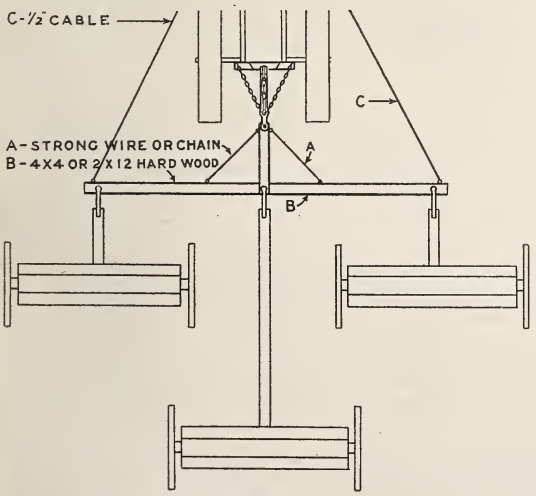


Fig. 3.

the disk harrows. This can be done either by connecting the smoothing harrow draw-bar to the frames of the disk harrows in front or by running the connection ahead to the main draw-bar. This combination is a good one to use where it is necessary or desirable to conserve moisture.

Hitch for Three Disk Harrows or Drills.

Where a tractor has power to pull three machines at a time, and there is need for doing the work in a hurry, Fig. 3 illustrates how such a combination can be made. In this arrangement the longer pole is used with the machine in the center because this arrangement makes the outfit turn easier. This is a very satisfactory hitch for three machines with but little backward and forward motion, and prac-

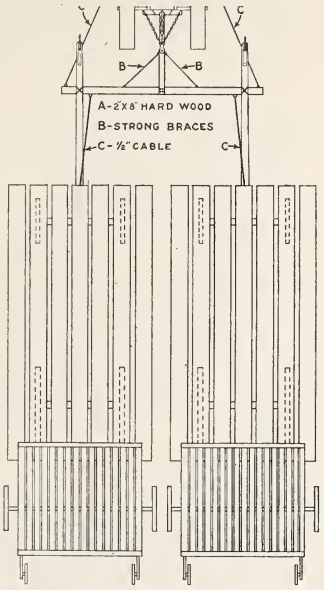


Fig. 4.

tically no see-sawing of the machines when a fore-carriage is placed beneath the stub tongue.

Hitch for Two Hay Loaders.

For loading hay on level ground there is nothing better than the steady power of a tractor. Again the general purpose draw-bar is easily adapted to the hauling of two hay loaders. The relative positions of the wagon poles on the draw-bar are governed by the regulation width of the windrows. It will be found an advantage here to have the ends of the draw-bar supported by caster wheels or wheels with stub axles to keep the draw-bar and wagon poles off the ground. It must be remembered that such a hitch as this (Fig. 4) offers no means of holding the wagons back on a hillside except by the friction of the rake teeth on the ground. It is not a difficult matter, however, to arrange brakes for the wagon wheels in places where the haying is done in hilly country.

Hitch for Plows and Peg or Disk Harrow.

The combination shown in Fig. 5 is intended for use with a three-plow tractor where one of the plow bottoms is removed and a peg or disk harrow substituted for it. The construction of this hitch is simple. A 2x4 hardwood piece is attached to the

plow beams by means of U-bolts in such a manner that it extends over the furrow just turned. At the outer end of this draw-bar holes should be bored to allow for adjustments in the position of the har-

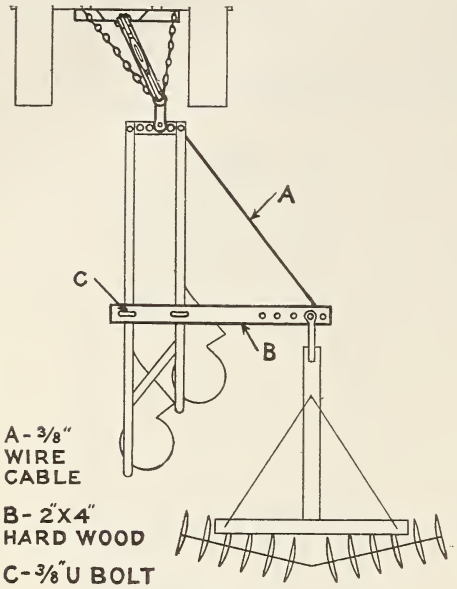


Fig. 5.

row. A chain or wire cable running from the front end of the plow to the outer end of the draw-bar keeps the harrow in its proper position and tends to relieve the side strain on the plows.

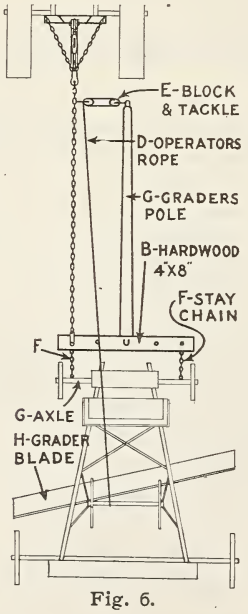


Fig. 6.

Offset Hitch for Road Grader.

In grading roads it is an advantage to be able to keep the tractor in the center of the road or near the center, while the grader is working in the ditch. This requires an offset hitch which is not always supplied with the grader. Fig. 6 shows how a simple offset hitch can be made for such work. The hitch is made by bolting the grader pole firmly to a piece of 2x6 hardwood about 4 feet long, from the ends of which stay chains connect with the grader axle. Attachment to the tractor is made with a draw chain a few inches longer than the grader pole, extending from one end of the new evener to the tractor. The width of the offset may then be controlled by the operator on the grader by means of a block and tackle connection between the end of the pole and the draw-bar chain. This arrangement has proved very satisfactory and can be used on either side of the tractor.

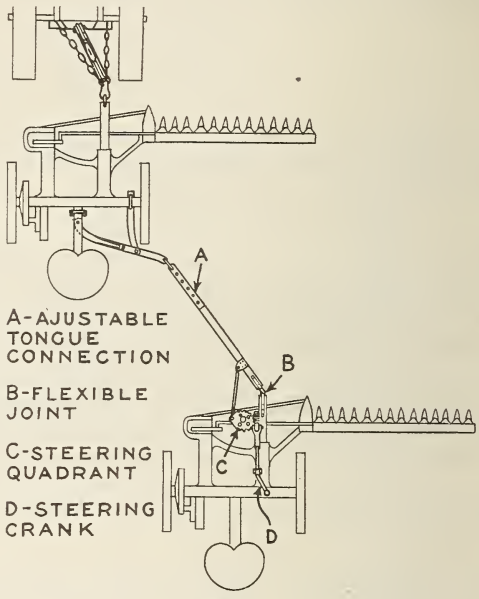


Fig. 7.

Hitch for Two or More Mowers.

Fig. 7 shows the outlines of a hitch manufactured by the International Harvester Company for attaching two or more mowers behind a tractor. The first mower is connected directly to the tractor draw-bar by means of a stub pole. The first mower requires no operator, for the operator of the tractor can raise and lower the cutter bar when necessary. The second mower is attached to the first by means of a bracket clamped to the axle of the first mower. From this bracket a flexible, adjustable tongue connection, marked A in the diagram, connects to the second mower. This tongue is adjustable to accommodate different widths of mower cutter bars. The attachment for the third mower corresponds to the attachment for the second. The proper width of cut is maintained by means of a crank and quadrant attached to the stub pole and flexible pole of the trailing mower. A series of mowers connected in this manner cannot, of course, be expected to

turn a sharp corner. For a non-stop run, the field should be laid out with rounding corners.

Trailer Hitch for Grain Binder.

With a trailer hitch the grain farmer can operate as many binders behind his tractor as the tractor has the power to pull. Various types of hitches have been designed to meet the requirements of the different lines of harvesting machines on the market. The harvester company sells tractor hitches for its lines of harvesting machines, the attachment and operation of which are simple. The first binder is connected directly to the tractor draw-bar by means of a stub pole. The poles on the trailing binders are pivoted to a rigid frame and controlled from the seat by a gear quadrant and pinion with a crank. This system of control enables the operators of the trailing binders to swing the platforms of their machines through a wide radius to or from the grain. Such a hitch can be attached to these machines without any alterations or extra holes in the binder frames.

By using a tractor hitch on a header or header binder, the machine is pulled rather than pushed. Such a hitch requires two operators, one on the steering platform of the machine and one on the tractor.

GETTING PROPER BELT SPEED ON FARM MACHINES

One of the problems which both the farmer and the machinery maker have to solve is the proper speed at which the machines should be operated. It is quite evident that the speed at which a machine is operated has a great deal to do, not only with the amount of the work it does, but with the quality of the work that is done. With cream separators, for instance, we are constantly being reminded that unless a certain range of speed is maintained we are losing a valuable portion of the cream. Devices are being invented to enable the hand-turned cream separator to give a signal when it is at the proper speed, but there are no such signals to be secured from the feed grinder, the ensilage cutter, the threshing machine, etc. The only warning signal we get usually from incorrect speeds of such machines is the smaller amount of work that we find has been done at the end of the day, or the poorer sort of work we notice the machine has turned out.

Take the case of a feed grinder. According to the data sheet of the National Gas Engine Association, the power required to grind a given capacity of feed, assuming the grain to be in moderate or fair condition, is as follows:

Speed R. P. M.	H. P. Required	Bu. Ground Per Hour
550	1.9	10
670	2.19	15¾
800	3.	20
920	3.40	21¾
1150	4.54	30

Picking out a machine and an engine, purely by chance, we find that a certain feed grinder is rated to run at 800 to 1,000 r. p. m. and has a 10x6 pulley, giving a rated capacity of 20 to 35 bushels per hour and requiring "4 to 8 h. p." A certain make of engine is rated at 5 h. p., 325 r. p. m., and pulley 18x 6½. Let us see how these two machines would fit together if we were to buy them indiscriminately and without making any advance comparisons as to whether or not they were properly related to one another. To do this we must figure out the speeds from the engine, etc.

The common method of figuring out speeds is by using the formula $D \times R = d \times r$, in which D is the diameter of one pulley multiplied by its speed, and d is the diameter of the other pulley multiplied by its speed. If you have three of the items you can easily figure the fourth.

In the above mentioned case we have an engine with 18-inch pulley running at 325 r. p. m., and the diameter of the pulley on the feed grinder is 10 inches. What will be the speed at which the engine will actually operate this feed grinder pulley? Using the above formula, we have:

$18 \times 325 = 10 \times r$ or $10r = 5850$ or $r = 585$

In other words, if we put this engine onto that feed grinder it is going to turn the feed grinder pulley 585 r. p. m., whereas the manufacturers recommend that it be run at from 800 to 1,000 r. p. m. As it is going to be run at but little more than half the reckoned speed, we can naturally assume that it will take care of but 10 to 18 bushels per hour instead of the expected 20 to 35 bushels.

Or, if we have these same machines and we wish to know what size pulley should be on the grinder to give the right speed, we have the formula as follows:

$18 \times 325 = d \times 1000$ or $1000d = 5850$ or $d = 5.8$, or nearly 6 inches.

The feed grinder, therefore, should have about a 6-inch pulley if it is going to produce the correct speed from this engine, instead of the 10-inch pulley with which it is regularly equipped.

We can readily see why either the engine or the feed grinder is going to be branded by the purchaser as "no good," if these two machines are run together without some figuring being done. If the feed grinder man happens to be on the ground, he is likely to blame the engine because it runs his grinder at only 585 r. p. m. and he may claim the

engine has not enough power. If the engine man happens to be on the ground he probably will claim that the feed grinder is overrated in its capacity and that nobody could expect such a machine to have the capacity at which it is rated. Take any of the other feed grinders and hitch them up to an engine in an equally "hit and miss" way and you are likely to run into just such conditions as the instance above cited indicates.

Suppose, however, that the farmer, or one of the manufacturers, or what is more likely to be the case, the dealer, had foreseen this probable trouble and had a special pulley fitted to the engine or the feed grinder, and everything is going along satisfactorily. The farmer has this engine on hand and he wishes to buy another machine of some sort. He may purchase it from a different dealer, or some farmer neighbor, or other source. Perhaps it never occurs to him that he ought to consider the question of pulleys and when he gets the other machine his troubles begin. It has not the capacity he expected, and he is "stung again," or so he says to himself. Or, it runs "like a cyclone" and after using it a few times he is either afraid to run it or it breaks down from the excess speed. Perhaps some good dealer happens to hear of the trouble and makes some inquiry about the speed question and gets him straightened out.

Now, the most natural question on earth to ask, in view of such conditions, is this: "Why wouldn't it be possible to have some sort of a standard so that when a man purchased an engine it could be fitted with a pulley that would give the correct speeds for any farm machinery to which it might be connected?" The answer to this question is, that it certainly would be possible to do this thing if only the manufacturers of engines and the manufacturers of farm machinery could agree on the standard, adopt it and use it. The standard that has been adopted by the S. A. E. is 2,600 feet per minute, but few manufacturers of either tractors or operated machines have altered their speeds accordingly.

Take the case of the engine and grinder used above as illustrations. To get the belt speed of pulleys, multiply the circumference of the pulley in feet by its revolutions per minute, which gives the belt speed in feet per minute. The diameter of the circle, or pulley, multiplied by 3.1416, gives the circumference. The 18-inch pulley is 1.5 feet in diameter; multiplied by 3.1416, equals 4.7 feet as the circumference of the pulley in feet. This multiplied by the revolutions, or 325, gives 1,527 as the belt speed in feet per minute. That is, the engine will carry the belt at that speed.

Now, on the feed grinder, as regularly equipped by the manufacturer, the pulley is 10 inches in diameter, or .83 of a foot; multiplied by 3.1416, the circumference of the pulley in feet is 2.6, and if this pulley is run from a belt traveling at 1,527 feet belt speed, then the pulley will be operating at 585 r. p. m., which agrees with the figures previously secured.

If we could assume that 1,527 would be a standard belt speed, then all manufacturers of farm machinery could equip their machines so that their pulleys would run at that belt speed, and then everything would be satisfactory. A man would buy an engine and then purchase half a dozen other machines with never a thought as to this matter of pulley sizes, or why the machine had not the capacity or what made it run at such a terrific rate so that it would go to pieces quickly. A number of belt speeds have been proposed at various manufacturers' meetings, but no common ground seems to have been discovered for the selection of a uniformly satisfactory belt speed rate.

Another formula for the securing of belt speeds, and one which is a short cut, but which is less easily understood as to why it is a correct method, is to multiply the diameter of the pulley in inches by its r. p. m., and multiply this by .262, which gives the belt speed in feet per minute.

The important thing for the dealer to do then is to bear in mind the conditions as indicated by this supposed case and keep in his head, or where he can reach them, certain facts as to what are the rules for determining these correct pulley sizes. Some of these are as follows:

The driving pulley is the pulley on the engine, motor or other source of power.

The driven pulley is the pulley receiving the power.

To find the size of the driven pulley that should be used, multiply the diameter of the driving pulley by its r. p. m. and divide by the r. p. m. of the driven pulley.

To find the speed at which the driven pulley will run, multiply the diameter of the driving pulley by its r. p. m. and divide by the diameter of the driven pulley.

To find the speed of the driving pulley that will give correct speed to the driven pulley, multiply the diameter of the driven pulley by its r. p. m. and divide by the diameter of the driving pulley.

To find the size of the driving pulley that will give proper belt speed, multiply the diameter of the driven pulley by its r. p. m. and divide by the speed of the driving pulley.

These four rules ordinarily will enable the dealer to solve all problems satisfactorily, as he usually knows the speed of one machine and two pulley sizes, or both speeds and one pulley size, or both pulleys and one speed. As previously stated, with knowledge of any three of the items, the fourth may be figured.

Sometimes a dealer is called upon to figure out pulleys for a line shaft or counter shaft for a farm-

er's home shop. By using the above rules and taking a medium speed as the speed at which the counter shaft should be run, the dealer can figure out just what pulleys will be needed on the shaft to enable the farmer to drive every piece of machinery he has. Some of these counter shafts are furnished in stock form, and with such a shaft the dealer can readily figure the size of the pulley to be driven from the engine, and then figure just what sizes the pulleys on the shaft, or the pulleys on the various machines, should be made to produce proper speed.

With the exception of cream separators, it is not necessary usually to figure speeds or pulleys out to the exact fraction of an inch. A difference of possibly 40 or 50 r. p. m. in the speed of a machine makes but little difference. For instance, a feed grinder giving a certain capacity at 900 r. p. m. will not be vitally affected or the output materially changed by running it at either 940 or 875.

POINTS ABOUT BELTS

There are three kinds of belting, leather, rubber and canvas. Each one has special advantages, either of durability, efficiency or economy, but no one kind combines all advantages in the maximum.

Under proper protection leather belting of good quality is supposed to be the most durable, but it is susceptible to deterioration from heat and moisture. For this reason, and also because of the high price of leather at the present time, other varieties of belting are in greater demand for farm work. In using leather belting it is well to remember that the grain side of the belt, that which has had the hair, should be run next to the pulleys. Otherwise the belt may check and crack, as the grain side is stronger and harder.

Rubber belting can be used under conditions of moisture and heat that would ruin good leather belting. It is strong, grips the pulley well, and is thus usable where other kinds of belting give trouble through slippage. It does not contract and expand as does canvas belting. Like all rubber, it is damaged by oil and grease, and for this reason is not always the best variety for farm engines where oil may be spattered.

Cotton or canvas belting is durable and can stand much punishment from the elements. For this reason it is extensively used with tractors. It contracts and stretches with changes of humidity and temperature, so much so that it is often unsatisfactory for use on permanently fixed engines and machines where the belt cannot be kept tight except by unlacing and shortening. With tractors where the outfit can be backed to tighten the belt, it is not influenced by this limitation.

There always is trouble in belt work if the size of the pulleys on both driving motor and driven machine are not harmonized. This has been discussed many times in reference to a standard belt speed for tractors and engines.

It is well to remember that the driving side of the belt should be underneath. With the slack on top, the belt tends to hug the pulley more and there is less likelihood of slippage.

The straight belt, when it can be run under constant tension sufficient to prevent slipping, is more efficient than the crossed belt. Many times, however, it is necessary to cross the belt in order to get it to hold and to drive a machine in the right direction. In tractor belt work the belts are almost always crossed to get a firm grip on the pulleys.

If there is trouble from the belt sliding off a flat pulley, relief often can be obtained by putting on a new crowned pulley. This is due to the fact that a belt tends to ride the highest point, and if this is the center of the pulley, the belt usually remains there.

The capacity of a belt to transmit power depends on its velocity, an argument for high belt speeds, and the average of the tension on the two sides. As the tension depends on the friction on the pulley, it is apparent that a wide belt in general will give better results than a narrow one. Thus in choosing between a narrower belt of more plies and a wider one of fewer, choose the wider one.

Trouble from belt slipping also can be overcome by increasing the size of the pulleys on both driving motor and driven machines, care being taken to maintain the proper relation between the two pulleys.

Canvas and rubber belting is made from two-ply up, four-ply being considered the equivalent of leather belting.

SCRAPING BEARINGS ON VERTICAL MOTORS

BY GEO. P. COGDAL.

The common practice in bearing scraping or fitting is to turn the motor upside down, place Prussian blue on the journals of the crankshaft and then proceed to bolt the bearing caps on so tight that the crankshaft can just barely be rotated in the bearings.

The cap is then taken off and the high spots scraped on both the cap and crankcase bearings. The crankshaft journals are again blued and the cap bearings are bolted tight the same as stated above.

Now with this process it can be plainly seen that the crankcase bearings will acquire a perfect bearing due to the fact that no matter how tight the cap bearing is bolted on, the shape of the crankcase bearing will not be changed. (Fig. 1).

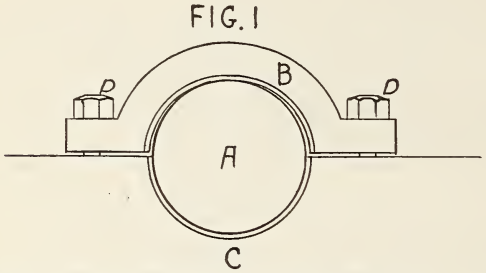


Fig. 1—A=Crank Shaft; B=Cap Bearing; C=Crank Case Bearing. By tightening nuts D, cap bearing can be sprung down tight around shaft A, but lower bearing C cannot be sprung, due to the fact that it is rigid.

But the cap bearing has been drawn down tight around the journal, and although it may show a perfect bearing surface, it can be seen that it has been sprung to a perfect bearing due to the tightness with which the cap was bolted down. (Fig. 2).

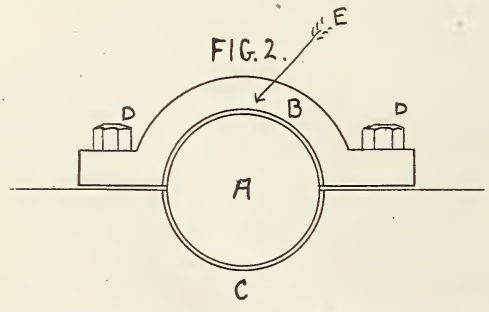


Fig. 2—Cap bearing B has been sprung down around shaft A and arrow E points to spot where pressure is greatest on cap bearing.

In the operation of a vertical motor it is found that the greatest pressure or wear is exerted on the cap bearing. For instance, if on a four-cylinder motor one piston was being forced up on the compression stroke and another piston driven down on the power stroke, the cap bearings of the main journals are receiving the load of both forces and the upper or crankcase bearings are receiving practically no load or wear.

If the cap bearings are to receive practically all the load, they must be made a perfect bearing, much more so than the crankcase bearings.

To secure best results with bearing scraping, first place crankshaft in a lathe and be sure that it is true within say, four thousandths of an inch. Any good machinist can do this work. If shaft is not true take it to a machinist who can true it up by pressing or springing it cold.

Any shaft which is so badly out of true that it will not stand being sprung back to within .003 of an inch of true is not fit to be used and a new crankshaft should be secured.

With the motor or crankcase placed upside down first cover the journals of crankshaft with a very light coat of Prussian blue and place crankshaft in crankcase bearings.

Rotate crankshaft five to ten times by pulling up on crank pins of crankshaft, for if a downward pressure is exerted it may cause the shaft to spring and a false reading on bearings will be the result.

Now remove the crankshaft, and having decided which portion of the bearings are holding the crankshaft out of what would be its true center of rest, scrape away these spots or points. Scrape lightly as the cut approaches the sides, taking cuts diagonally first in one direction, then in the other, in order to prevent grooves.

After the crankcase bearings have been scraped to as good a bearing as is possible, the cap bearing may be fitted.

With the crankshaft resting in crankcase bearings and a light coat of Prussian blue on the journals, fit cap bearings one at a time.

Put the cap bearing in place and with the fingers screw nuts down till they are just a little tight. (Fig. 3).

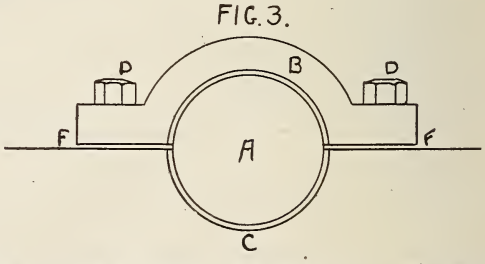


Fig. 3—Nuts D should be screwed down with fingers, and no tighter, while taking readings. Shims should be placed at points F after a perfect bearing has been secured.

Now rotate shaft five to ten times and remove cap bearing. Scrape high spots and again tighten

cap bearings down with fingers. Proceed taking readings and scrapings in above manner till bearing shows a perfect fit, and if shims are to be used they should be of correct thickness so that when the cap bearing is bolted down tight after final adjustment, the crankshaft can be turned by hand after oil has been placed on bearing.

The amount of clearance to be used in a bearing depends upon the oiling system used. If a high oil pressure system is used the bearing can be fitted quite loosely. By scraping bearings to a perfect fit and then placing shims of about two-thousandths of an inch, a clearance is left which will give excellent results if a high oil pressure system is used, say 25 lbs. to the square inch.

But where a splash oil and gravity system feed is used, the clearance must be just enough to allow a good film of oil on all parts of bearings.

In fitting main bearings great care must be taken to see that the crankcase bearings are not scraped away so much that the gears, camshaft and crankshaft gears, mesh too deep or "bottom." When this happens new babbitt should be used.

It is always best when possible to take out center crankcase bearings and fit end bearings first.

In doing this there is no support under center of crankshaft, so on 4 or 8-cylinder motors the crankshaft should be rocked back and forth horizontally as in this way it cannot spring out of true.

Note with horizontal motors and a few vertical motors, the cap bearing may be found to be the upper bearing, but the system of fitting or scraping would be practically the same.

FIG. 4.

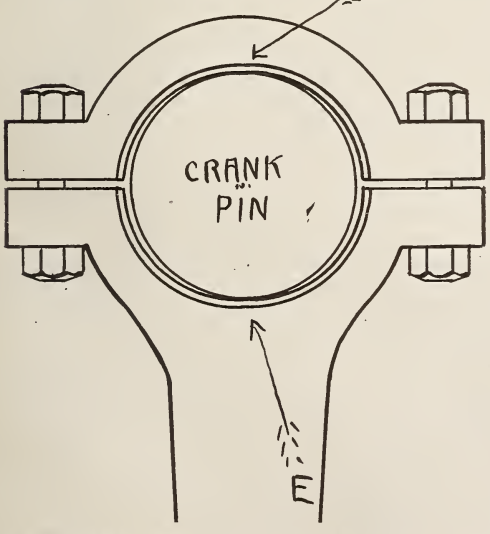


Fig. 4—This shows how both cap bearing and connecting rod bearing may be sprung by tightening nuts too tight while taking readings. When bearings are tightened in this manner, points E are tighter on shaft than sides of bearings.

Connecting Rod or Crank Pin Bearings

Fitting connecting rod bearings can be done in two or three ways and very good results obtained.

The so-called "hammering in" or "running in" process is very commonly used on main and connecting rod bearings, and bearings fitted this way

FIG. 5.

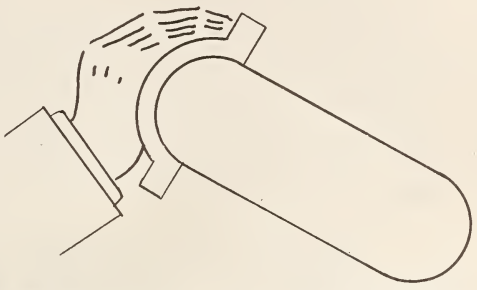


Fig. 5—Method of rocking cap bearing or connecting rod bearing on crank pin by hand.

will stand up for a short while, but if good and lasting results are to be obtained these systems should be barred.

When a bearing is bolted down tight, as in above systems, and a reading taken, it is found that the top and bottom of the bearings are much tighter on crank pins than the sides, which causes the lubricating oil to be much thinner at the points where it is most needed. (Fig. 4).

FIG. 6.

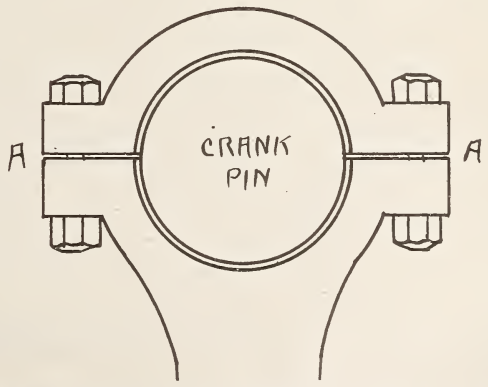


Fig. 6—Shims should be placed at points A after a perfect bearing has been secured.

As soon as these tight or high spots wear down, the shaft is loose in the bearing and the bearings must be refitted.

To secure lasting results cover the crank pin with light coat of Prussian blue, then take cap bearing in right hand and place it on crank pin, rock it back

and forth five to ten times (Fig. 5), and then scrape high spots till bearing shows about a 50 per cent bearing.

Where dial test indicator and surface plates can be secured, excellent results can be obtained in the alignment of the connecting rod and piston pin.

Where these instruments or tools cannot be secured, the connecting rod may be rocked back and forth on crank pin the same as cap bearing until a 50 per cent bearing is obtained.

Now place piston in cylinder and for the first time bolt both halves of connecting rod bearing together, not forgetting the blue on crank pin. (Fig. 6).

Nuts in this case should be tightened down with fingers, being careful that the bolts fit freely without tendency to pinch the bearing at the sides.

Now rotate crankshaft five to ten times, remove connecting rod bearings and scrape high spots until a perfect bearing is secured.

Place shims, if used, in place and bolt nuts down tight.

On a worn bearing the common practice is to remove shims and tighten up bearing. This will do for a short time, but to have a smooth running motor and save time and money, the bearings should be examined, and if scraping is needed, it should be done.

In all bearing scraping it is best to give newly scraped bearings less clearance than old bearings, due to the fact that old bearings have been smoothed down to conform to the shape of the crank pin or crankshaft journal.

Newly scraped bearings are more apt to wear down and allow too much clearance, causing a knock and excessive wear.

FARM TRACTOR AND TRUCK IGNITION

BY E. P. GOULD.

The writer believes the best way to treat this subject is to place himself in the farmers' and dealers' position, anticipate their many troubles and show them what to do and what not to do to overcome them.

In the first place, the choice of magnetos is not left to the user and dealer, but is dictated by the manufacturers, who are not always the best judges and sometimes are trying to save a dollar in their production; also, it is necessary for the manufacturers to time magnetos with their engines previous to shipment.

The choice of ignition for service as serious as a tractor or truck should be a high tension magneto with impulse starter coupling that will fire all cylinder compressions for starting purposes. The magneto and impulse starter coupling must be encased by the manufacturer to protect it from the weather, dust and dirt. It should be by preference bolted to a non-ferrous bracket—brass or aluminum—to engine base, away from exhaust pipe heat. Flexible coupling should be of a material that will stand sudden and constant torque set up by the impulse, which is about forty pounds, without putting magneto off time with the engine in a short while.

The Society of Automotive Engineers' standards should be preferred in all cases of magneto application, including couplings.

There are several good high tension magnetos on the market, and the users of tractors and trucks should be careful to choose a popular make for their service, one that the makers guarantee, and with service stations dotted around the country, for what electrical business can succeed nowadays without quality and service!

Manufacturers of tractors, trucks and engines always prefer to install the ignition equipment; first, to test out the engine from five to ten hours under its own gas; second, to be sure engine is timed right and they are getting all the horse power built into it to fulfill their guarantee; and finally, the magneto being of the alternating type, it must be carefully timed to the engine, which would be a difficult task for those unfamiliar with the subject and not manufacturing. This is the reason one never sees jobbers, dealers and others solicited by manufacturers of magnetos for business. However, it is true they have and may be selling a small direct current generator that was formerly called a magneto and is intended for friction or belt drive, producing light as well as low tension ignition for stationary engines.

With the magneto of today, manufacturers should mark its proper timing before it leaves their shops, so the farmer and others, including the garage men in the field, can remove the magneto for repairs and replace it in exact time. Some manufacturers do this, but many do not, causing all kinds of field troubles and at times necessitating an expert to travel many miles at great expense.

Timing the magneto is very simple when understood, and for the information of readers, in order to check up this condition in the field, the writer will outline the way it is accomplished.

No. 1 cylinder of engine is usually considered the cylinder of the engine adjacent to the power application. This cylinder should be put on dead center of its firing stroke. The magneto, being unadjusted on the shaft, should be brought into position with the distributor and breaker box caps removed and the distributor block placed in position to fire No. 1 cylinder, which would be in connection with the carbon collector for No. 1 terminal When this is accomplished, note the platinum interrupter points

in breaker box and see that they are just beginning to separate. Check this latter minute adjustment several times to be sure you are right. If you are, fasten magneto to shaft in a rotative way and connect up your terminals according to the order of firing the cylinders and the marks on magneto distributor cap. The order of firing the cylinders is usually marked on the engine and should be carefully noted, for all four-cylinder engines do not fire alike.

When timing a magneto with impulse starter coupling, disregard the impulse coupling entirely, unless manufacturers advise you to take this article into consideration. As a rule, the impulser will take care of the starting sparks by creating them a few degrees later than late, considering in this case dead center late, and prevent any accident such as the engine firing backwards and injuring a person's arm. Consequently the impulser is a very cheap and efficient accident policy which should not be overlooked. In fact, all multiple cylinder engines and some stationary engines should be equipped with this article.

Magnetos must be taken off at times, not frequently, and sent back to maker's service station for general overhauling, inspection and repairs. This insures good ignition. If an engine is running steadily the year around, this should be done annually; on the other hand, if it does only six months' work a year, then it should be overhauled bi-annually. A gas or oil engine is no better nor more powerful than its weakest part, and when you take into consideration that your engine would not be an engine without a magneto or other vital accessories, and these parts are a distinct and separate mechanism synchronized with your engine, you appreciate how important these remarks are. Your engine and running gear need attention, such as cleaning, adjustments, repairs and lubrication, and your magneto, which is just as simple but smaller, using more costly materials, requires this attention likewise.

I am going to explain this just as if I was on the farm and remote from large commercial centers, showing how you can overcome 90 per cent of your magneto troubles, both real and imaginary. I add imaginary for the reason that many of the troubles attributed to the little hard-working magneto can be traced elsewhere in the mechanism of your machine.

First, be sure you get all the instruction bulletins that go with your purchase and study these; also all the instructions of a personal nature from the seller. Then fit yourself out with a 25-cent can of Finol or Three-in-One oil, a screwdriver and small wrench that goes with magnetos, also a micrometer thickness gauge reading from .004 to .025 of an inch. This latter article is very necessary, as further developments will show.

This is all the magneto equipment you need and should be kept exclusively for its use. While your machinery is new and for a time thereafter, everything will run smoothly, barring accidents of course, and providing you let it alone. Your first magneto interruption is quite likely to be from using engine oil—either too much or none at all. Now right here I must emphasize the fact that you must not use engine oil on the magneto, for the best is not good enough. There is only one type of lubricating oil that should be considered. It is a many-times refined and filtered neutral oil, such as Finol or Three-in-One. They are free from acid, gumming and carbonizing properties, having a cleaning influence and stay where placed. A 25-cent can of either will last about a year, which is certainly cheap lubrication, and saves the largest part of your troubles.

The armature or rotor runs in ball bearings, which are easily cared for by lubrication, also in some cases the distributor gear runs on a ball bearing. This condition is admirable, and I hope will be the rule in the future. These bearings have the principal oil cups shown externally at each end of magneto, three in number. The other important oil cup is located in the breaker box and usually is under its cover to keep dirt out. Due to its small capacity and the frequency of movement of the breaker arm which it lubricates, it should have special attention, for it will only hold a drop or two of oil at a time. In caring for the breaker box mechanism, always inspect platinum points. Wipe these clean with a piece of paper or card to remove oil from their contact faces; also wipe face of cam clean and put a thin film of oil over it.

Regarding lubrication of impulse starter coupling, manufacturers differ in their recommendation. Some specify a good castor oil, while others a grease. Where the latter is used a non-temperature type (that means a grease that will not melt due to engine heat and also remains in a constant consistency during zero weather—Keystone is of this type), is to be preferred.

Magneto adjustments are vital to good results and service in the field. The writer will touch only upon the external attention required. This is as far as one ought to go outside of manufacturers' service stations. The several makes of magnetos in the United States have different characteristics and it would not be possible to cover all in this article, except in a general way.

The platinum interrupter contact points in the breaker box should open from .016 to .022 of an inch, according to manufacturer's formula. This information you must learn from each respective maker who furnishes a gauge for his products, and do not use one maker's gauge for a different type of magneto, for the chances are they are not both alike in this respect. Check these adjustments from time to time, and they are adjustable. See that the magneto is clean and properly oiled, and you need not fear any troubles from this source.

Regarding spark plugs, it is a good rule to gauge the gap of electrodes with your thickness gauge, and

be sure this gap is between .020 and .025 of an inch apart before inserting into engine. Also from time to time remove, inspect and clean interior of spark plug combustion chamber. It will accumulate carbon, due to poor carburetion. Also adjust if necessary, and this may be frequent, as the interior of plugs is left rough, and the edges are not broken by manufacturers, so they foul up quickly.

Spark plugs should not protrude into combustion chambers of engines. The electrode gap should be flush with inside wall of combustion chamber where the best gases are in order to ignite readily.

If an engine has loose and worn piston rings, due to dust and dirt in the field and road, and has worn out its compression for lack of an air cleaner, which is the life of a gas engine, the spark plugs should be of a size shorter, or in other words, contact points of plugs should be one-quarter inch shorter or recessed from the above formula given, this being the only method to protect good ignition from missing due to too much oil passing piston rings.

If this condition occurs, the engine should be overhauled and new rings applied. A good rule to follow with spark plugs is to have the gap the same distance apart that the magneto uses for its platinum interrupter points, although a little more latitude is permissible; but do not get this gap over .025 of an inch. The old saying of spacing spark plug points apart the thickness of a worn dime is a fallacy and should never be practiced, due to the uncertain thickness of the dime, which is usually too large a space, causing missing when the engine is working hard.

Cables are very often the source of your troubles and it is a mysterious field condition. But when you realize rubber insulation is only good for about one year, it will pay you handsomely in insurance to change your secondary cables annually than to take the risk of electrode leaks. Your magneto is pumping about 30,000 volts through these cables, and electricity will travel along the lines of least resistance and escape under atmospheric pressure instead of jumping a spark plug gap under from 40 to 125 pounds' pressure in the cylinders of your engine. So it is always best to keep cables out in the open. Never let these be placed in metallic conduits or metal guide rings or touch any part of your engine which becomes a natural ground for the magneto; also keep away from engine heat and oil, as both deteriorate rubber very rapidly.

I have often passed my finger over old cables while an engine was running and felt the leakage of electricity, yet I could not see a crack or an abrasion in the insulation. However, the changing of cables in these cases stopped the troubles.

Regarding carburetion influence on ignition, the absence of air cleaners and poor lubrication, due to worn parts, together with poor adjustment in the compounding of your gas, are the principal troubles. Many times a magneto is blamed for these conditions when it should not be. I shall take up items as named in the summary of this article. Of course, books could be written on these subjects, but I shall only brief the principal conditions.

Carburetion affects ignition the most. Its greatest trouble nowadays is the lowering of the grade of gasoline, which restricts its latitude, making it very uncertain to regulate. In the days of old-fashioned gasoline, the proportions of air and gasoline could vary 5 per cent without any perceptible difference. With today's gasoline, half that percentage of variance will be noticeable; and with kerosene, variation of over 2 per cent in compounding the gas is not permissible. All these conditions affect ignition, and we in the field cannot help it. It is the carburetor manufacturers who should improve conditions. The writer cannot help thinking that eventually the injection system, similar to the Diesel principle, will be adopted.

It is a known fact that we use too much fuel in our field work, and with that in mind magneto manufacturers have from time to time added to their angular advance of spark until 40 degrees is now standard with some manufacturers. In fact, the writer has used 50 to 60 degrees advance of spark with several high-speed marine and aeronautical engines.

This is done to kindle the fire before compression takes place, when explosion occurs, thus converting a saturated and "foggy" mixture into an anhydrous or dry gas for the engine to work with. This improves ignition conditions a lot, thanks to the magneto manufacturers.

A few words about air cleaners. It is realized more and more every day that the gas engine respires like the human being when functioning and requires protection from floating and foreign matter in the air, for the engine must have pure air to prolong its life, as it needs pure, filtered lubricating oil and gasoline. Therefore I consider a good air cleaner one of the most important accessories to the engine.

I will tell you how it affects ignition. During the tractor demonstration of nine weeks in 1916—eight weeks in the United States and one week in Canada —the writer was approached more than once by tractor and engine manufacturers who complained the magnetos he had recommended to them had failed to ignite their engines. On investigation the writer and his assistants found the compression was ground out of the cylinders, due to dust and dirt in the field held in suspension in the air with no means of separating it from the gases the engines used. The magneto ignited all right, but without compression there was no power, much to the surprise and disgust of all concerned at that time.

If an air cleaner manufacturer with a carload of cleaners had been present, he could have sold all very easily.

Touching again upon lubrication and its effects

upon ignition, the user should naturally obtain the best oil for the purpose, and his big effort will be to confine it to its respective places, for if the oil should pass the piston rings and get into the "fire box" of his engine, which is the combustion chamber, where about 3,000 degrees F. temperature is present, it will foul up the ignition system in particular and the cylinders in general and interrupt the engine's progress. Such a condition sometimes necessitates the re-boring of cylinders and the addition of over-sized pistons and piston rings to overcome the trouble.

The writer trusts the foregoing will be read and studied by every user in the field using agricultural machinery with power attached. It will assist in overcoming some of the mysterious conditions which have confronted farmers and dealers and have not been touched on by previous text. When in doubt on any subject touched upon, it would be best to consult the maker of the magneto direct at the factory or nearest service station, rather than the many so-called "magneto experts" in the country. By so doing it no doubt will save money and much time, for please remember that magneto manufacturers guarantee their product for one year from date of sale.

TRACTOR POWER DATA

BY GEO. CORMACK.

At present there is considerable talk among those who build and sell tractors of the necessity for a wider and more general dissemination of real practical knowledge of these machines among the American farmers. Some of the larger builders of tractors are doing a real and constructive service for themselves, the dealers and the farmers and the industry at large, through tractor schools which they conduct at certain places and seasons for the instruction of their dealers, and the dealers' customers.

Although there always is connected with these schools an effective individual advertising benefit, it is altogether legitimate, and the general benefit to the farmer and the tractor industry cannot be overestimated. Any method of efficiency diffusing correct, definite knowledge of tractors is worthy of the heartiest support of everyone in the industry. It is the duty of every tractor builder to do all he can to give to the man who uses and to the dealer who handles his machines all the correct data possible, not only regarding his own product but such data as in a general way applies to all tractors.

There are still many things about tractors which are more or less puzzling to the farmer and the dealer. Not the least of these are drawbar pull and horsepower. If we can establish a standard plowing speed for tractors of 2 1-3 miles per hour as suggested and advocated by the standardization committee of the Society of Automotive Engineers, and if the builders can be convinced that this is the correct speed and induced to build all tractors to run at that speed, then the problem would become much simpler. Even then, there would still be much requiring clear and simple explanation to the tractor user.

For instance, suppose a tractor speeded to travel 2 1-3 miles per hour and guaranteed to travel at that speed while pulling a certain number of plow bottoms. At first glance it seems obvious that if a measured distance were plowed in a certain number of minutes the question would be settled. This however in most cases would be untrue. It would be true only in cases where the footing was such that there would be no slippage of the drive wheels on the ground. Drive wheels of any known diameter have to make a certain number of revolutions to travel 2 1-3 miles, and in making that number of revolutions will actually cover 2 1-3 miles if there is no wheel slippage. But when the necessary number of revolutions to travel 2 1-3 miles have been made and, due to wheel slippage, a distance more or less short of 2 1-3 miles has been traveled, the work done by the tractor is absolutely equal to the work which would have been done if there had been no wheel slippage and the full distance of 2 1-3 miles had been covered; provided, that in both cases the number of revolutions of the driving wheels necessary to travel 2 1-3 miles was completed in exactly the same time. Do not confuse work done by the tractor with plowing done; a tractor may do as much work getting out of a hole as would plow a whole round of the field.

The correct method when estimating the power delivered by a tractor where the drawbar pull and the speed of travel is in question, is to count the turns of the driving wheels and use a dynamometer. If a tractor were chained to a telephone pole or some immovable object, and a dynamometer connected in the chain, when the clutch was thrown in the wheels would slip, and a certain drawbar pull would be shown by the dynamometer. The tractor would be standing still, but at the same time it would be doing as much work as if it were moving and pulling a load equal to that shown on the dynamometer. The amount of power being delivered at the drawbar could be estimated from the number of revolutions per minute of the drive wheels and the pounds pull shown by the dynamometer. The dynamometer is an instrument thus far unfamiliar to the farmer, but in the near future it will be necessary to have one of these useful

instruments within easy reach of every farmer tractor user. The up-to-date tractor dealer is going to be the fellow who will have one handy.

If all tractors were built to travel at the same speed when plowing, then in all cases, a certain drawbar pull in pounds would represent a certain drawbar horsepower, or one drawbar horsepower would be so many pounds pull, and dividing the total drawbar pull by this number would give the

TABLE No. 1.

Speed		Drawbar Pull
Miles per Hr.	Feet per Min.	Lbs Per. H-P
1	88	375
1 1/4	110	300
1 1/2	132	250
1 3/4	154	214
2	176	187
2 1/4	198	166
2 1/2	220	150
2 3/4	242	136
3	264	125
3 1/4	286	115
3 1/2	308	107
3 3/4	330	100
4	352	93
4 1/4	374	88
4 1/2	396	83
4 3/4	418	79
5	440	75
2 1/3	205 1/3	161

total drawbar horsepower. But the number of pounds pull for one drawbar horsepower varies with the speed of travel, and in order to know how many horsepower is being delivered at the drawbar it is necessary to know how fast the tractor is traveling.

Those who are familiar with tractors know that a tractor which will just pull three plow bottoms on low gear will not pull them on the high gear. Suppose, for instance, that the three plow bottoms require a drawbar pull of 3,000 pounds, the low gear on the tractor 2 miles per hour and the high gear 4 miles per hour. If the tractor drawbar pull on the low gear is 3,000 pounds it will only be 1,500 pounds on the high gear, and as the plows take a pull of 3,000 pounds to move them, it is evident that they cannot be moved on the high gear.

In order to help tractor dealers and users to figure quickly and easily what to expect from a tractor, two simple tables have been prepared and are here shown. Table No. 1 shows in the first two columns the speed in miles per hour and the corresponding speed in feet per minute. The last column shows the drawbar pull in pounds for each horsepower at any given speed. The speeds are given at quarter mile intervals from 1 to 5 miles per hour, and in the bottom line is given the 2 1-3 miles per hour speed, which may become standard.

If a tractor travels at one mile per hour or 88 feet per minute every 375 pounds drawbar pull will equal a horsepower. A drawbar pull of 3,750 pounds at a speed of 1 mile per hour would therefore represent 10 drawbar horsepower. At 5 miles per hour, 3,750 pounds drawbar pull would be equal to 50 drawbar horsepower, because at that speed 75 pounds drawbar pull is equal to one drawbar horsepower.

Table No. 2 gives, in the first column, drive wheel diameters in inches, from 36 to 96 inches. Column No. 2 gives the circumference of these wheels in feet, that is, the distance they would move over the ground in one revolution. The top line in the main part of the table gives speed of travel in miles per hour varying by quarter miles from 1 to 5 miles. The columns in the main part of the table give the number of revolutions per minute of each size of drive wheels at the different speeds in miles per hour. The revolutions per minute of the drive wheels are figured to the nearest quarter revolution. The last column shows the 2 1-3 miles per hour speed; the number of revolutions of the different wheels are figured in this instance to two decimal places.

To use the tables: Suppose a tractor with 60-inch drive wheels. How fast is it traveling? Tie a white rag to a spoke in one of the drive wheels and count how many turns the wheel makes in one minute. Suppose the wheel is turning 12½ times in a minute. Look down the first column in Table No. 2 until you come to 60. Look along the line opposite 60 until you come to 12½ or the nearest number to it. At the top of the column in which you find 12½ you will find 2¼ miles per hour, the speed at which the tractor is traveling. Supposing further that a dynamometer test is being made at the same time and a drawbar pull of 3,200 pounds is shown. What drawbar horsepower is being delivered? In Table No. 1, opposite 2¼ miles per hour in the first column, 166 pounds is found in the last column. Divide 3,200 by 166, giving 19¼, nearly, as the drawbar horsepower.

These tables can be used to check extravagant

statements made by tractor salesmen. If a salesman claims that a tractor travels at such and such a speed, the buyer can easily check the statement by measuring the diameter of the drive wheels and counting the revolutions per minute. If a certain drawbar horsepower is claimed he can intelligently check the demonstration where a dynamometer test is made. Table No. 1 applies equally well to the crawler type of tractors, but No. 2 applies to tractors with drive wheels only. A study of the tables will show many uses to which they can be put, saving much figuring and uncertainty.

TABLE No 2.

Wheel Diam Inches	Wheel Circum Feet.	Miles per Hour: 1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	4¾	5	2½
		Speed of Wheels to make above Miles per Hour R.P.M.																	
36	9.42	9¼	11½	14	16¼	18¾	21	23¼	25¾	28	30¼	32¾	35	37¼	39¾	42	44¼	46¾	21.79
38	9.94	8¾	11	13¼	15½	17¾	20	22¼	24½	26½	28¾	31	33¼	35½	37¾	40	42¼	44¼	20.66
40	10.47	8½	10½	12½	14¾	16¾	19	21	23	25¼	27¼	29½	31½	33½	35¾	37¾	40	42	19.63
42	11.00	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	18.66
44	11.52	7¾	9½	11½	13¾	15¼	17¼	19	21	23	24¾	26¾	28¾	30½	32½	34½	36¼	38¼	17.81
46	12.04	7¼	9¼	11	12¾	14½	16½	18¼	20	22	23¾	25½	27½	29¼	31	33	34¾	36½	17.05
48	12.56	7	8¾	10½	12	14	15¾	17½	19¼	21	22¾	24½	26¼	28	29¾	31½	33¼	35	16.34
50	13.09	6¾	8½	10	11¾	13½	15¼	16¾	18½	20¼	21¾	23½	25¼	27	28½	30¼	32	33½	15.69
52	13.61	6½	8	9¾	11¼	13	14½	16¼	17¾	19½	21	22½	24¼	25¾	27½	29	30¾	32¼	15.08
54	14.13	6¼	7¾	9¼	11	12½	14	15½	17¼	18¾	20¼	21¾	23¼	25	26½	28	29½	31	14.53
56	14.66	6	7½	9	10½	12	13½	15	16½	18	19½	21	22½	24	25½	27	28½	30	14.00
58	15.18	5¾	7¼	8¾	10¼	11½	13	14½	16	17½	18¾	20¼	21¾	23¼	24¾	26	27½	29	13.52
60	15.70	5½	7	8½	9¾	11¼	12½	14	15½	16¾	18¼	19½	21	22½	23¾	25¼	26½	28	13.07
62	16.23	5½	6¾	8¼	9½	10¾	12¼	13½	15	16¼	17¾	19	20¼	21¾	23	24½	25¾	27	12.63
64	16.75	5¼	6½	8	9¼	10½	11¾	13	14½	15¾	17	18½	19¾	21	22¼	23½	25	26¼	12.25
66	17.27	5	6¼	7¾	9	10¼	11½	12¾	14	15¼	16½	17¾	19	20¼	21¾	23	24¼	25½	11.88
68	17.80	5	6¼	7½	8¾	10	11¼	12½	13½	14¾	16	17¼	18½	19¾	21	22¼	23½	24¾	11.53
70	18.32	4¾	6	7¼	8½	9½	10¾	12	13¼	14½	15½	16¾	18	19¼	20½	21½	22¾	24	11.20
72	18.84	4¾	5¾	7	8¼	9¼	10½	11¾	12¾	14	15¼	16¼	17½	18¾	19¾	21	22¼	23¼	10.90
74	19.37	4½	5¾	6¾	8	9	10¼	11¼	12½	13½	14¾	16	17	18¼	19¼	20½	21½	22¾	10.60
76	19.89	4½	5½	6½	7¾	8¾	10	11	12¼	13¼	14½	15½	16½	17¾	18¾	20	21	22	10.32
78	20.42	4½	5½	6½	7½	8½	9¾	10¾	11¾	13	14	15	16¼	17¼	18¼	19½	20½	21½	10.05
80	20.93	4¼	5¼	6¼	7¼	8½	9½	10½	11½	12½	13¾	14¾	15¾	16¾	18	99	20	21	9.81
82	21.46	4	5¼	6¼	7¼	8¼	9¼	10¼	11¼	12¼	13¼	14¼	15½	16½	17½	18½	19½	20½	9.56
84	21.99	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	9.34
86	22.51	4	5	6	6¾	7¾	8¾	9¾	10¾	11¾	12¾	13¾	14¾	15½	16½	17½	18½	19½	9.12
88	23.03	3¾	4¾	5¾	6¾	7½	8½	9½	10½	11½	12½	13½	14¼	15¼	16¼	17¼	18¼	19	8.91
90	23.56	3¾	4¾	5½	6½	7½	8½	9½	10¼	11¼	12	13	14	15	15½	16¾	17¾	18¾	8.72
92	24.08	3¾	4½	5½	6½	7¼	8¼	9¼	10	11	12	12¾	13¾	14¾	15½	16½	17½	18¼	8.52
94	24.60	3½	4½	5½	6¼	7¼	8	9	9¾	10¾	11½	12½	13½	14¼	15¼	16	17	18	8.35
96	25.13	3½	4½	5¼	6¼	7	8	8¾	9½	10½	11½	12¼	13¼	14	15	15¾	16¾	17½	8.17

BINDER AND MOWER TROUBLES AND THE REMEDIES

BY C. O. REED.

General Binder Troubles

It is the purpose of this article to discuss general binder troubles in a way that will be of use to the farmer and his helpers throughout the harvest season. It is then if ever that repair and trouble work must be quickly done and show positive results if loss is to be prevented.

The subject of binder troubles is too broad to be treated adequately in one article, hence a distinction is made between general binder troubles and binder-head troubles. A full discussion of binder-head and knotter-head troubles will appear in a subsequent article.

Setting Up the Machine

Some binder troubles may be traced to improper assembling. In assembling binders special care must be taken to observe the following points which are often overlooked:

1. Start the bull wheel into its quadrants straight. If care is not taken to do this heavy draft and main shaft difficulties will result.

2. After the bull wheel has been correctly entered, replace the retaining bolts in the holes at the bottom of the quadrants and smash the threads on these bolts to prevent them from being lost. This procedure will make it impossible for the operator to turn the bull wheel out of the quadrants and he will therefore have no occasion to get the bull wheel into the quadrants at an angle.

3. As a general rule, bolts should be so placed that the nuts are up and exposed to view. This often means greater ease in assembling and also enables the operator to detect quickly a loose bolt. This rule cannot be followed invariably, and must be suspended on occasions when the converse means securer or safer construction, or when a bolt head must be placed in a certain way to insure free action of adjacent parts.

4. As the rollers are put into place, coat the ends with a little hard oil, but do not add enough to smear the canvases.

5. As soon as the elevators are assembled square them by measuring the diagonals with two reel arms held securely together. Make these diagonals equal by means of the squaring adjustments.

6. After the butter has been placed, pour a good supply of kerosene into all bearings affected and turn upper roller of lower elevator several revolutions by means of a monkey wrench on the rim of the sprocket wheel. This will insure an easy working of the elevators, butter and reel-driving mechanism when the machine is first started in the field; and if there is undue binding, the trouble may be detected before the machine is erected sufficiently to cause a waste of time in tearing down. The upper elevator must not only be square, but the upper roller throughout its length must be parallel with the upper roller of the lower elevator.

7. Run all sprocket chains with the hooks leading and with the opening of the hook out.

8. Do not make an adjustment on a new binder-head while assembling the machine. Binder heads are thoroughly tested before leaving the factory and should not be meddled with.

9. Adjust all levers to work freely and to enter all stop points in their quadrants.

10. After the machine is apparently assembled, if two or three braces or castings are still at hand, do not throw them away. They are essential to the proper construction of the binder. Make an untiring and systematic search for their proper place.

Starting

Starting a new binder will be a quick and simple process if precaution No. 6 above has been observed. If possible, start the machine on a road or in a pasture before entering the grain field. Use plenty of kerosene for the first five minutes, taking notice that every oil hole and oil duct is open. If you are compelled to start the binder in the grain field, open the throat by throwing the butter well ahead and start in with a half swath only. If compelled to take a full swath at the start, cut the grain extra high. Do not fret because the knotter misses the first few bundles, and above all, do not adjust the head in any way until it has had time to clean or gives positive proof of misadjustment.

If Machine Fails to Start

Occasionally a new machine will fail to start due to some part sticking or catching. Throw the binder out of gear and start the team. This will test the bull wheel. Throw the machine in gear, remove elevator chain and then start again. This will test the shafts, sickle and packer shaft. Then throw off the reel chains, replace elevator chains, and start again. Thus the elevators may be tested. While the reel chains are off, test the reel by hand. By this method trouble may be located quickly. Never adjust a binder by the "cut and try" method, but seek the trouble in a direct and systematic manner, which in the long run will be found the quickest method to employ.

Chain and Gear Troubles

Undue wear on chains may be caused by the chains being run too tight or backwards. Place the chain on sprockets as stated under No. 7 of the

above precautions and do not run it tight enough to bind. Hook shaped sprocket teeth will cause chain breakage. This hook shape of the teeth is the result of running chains with the bar of the link first. The cutting out of gears between the countershaft and crankshaft is caused by (a) the improper mesh being allowed between the gears, and (b) the use of oil on gears working under sandy or dusty conditions. There is an adjustment at the inside end of the countershaft by which the shaft can be forced toward the crankshaft. By means of this adjustment keep the large bevel gear teeth working deep enough between the pinion teeth to insure against "stripping," but not deep enough to cause binding.

If the binder is being used in sandy fields or where dust will be picked up by the bull wheel and thrown over the main frame parts, do not use oil or grease on the main frame gears or on chains. It is better to run the gears dry under such conditions, but better yet is the use of a dry or flaked graphite which your dealer should carry to sell. Some farmers use ordinary stove polish with excellent results.

Canvas Creeping and Broken Slats

Canvas creeping and broken slats are caused by the elevators not being square, or by the front edge of the canvas being tighter or looser than the rear edge. Square the elevators as under No. 5 of the above precautions, and buckle canvas straps so that the front and rear edges of the canvas are at the same tension. Do not rely upon the strap holes as an indication that the sides are buckled to the same tension, especially in old canvases. Canvas straps stretch unevenly and are not a dependable guide. Test for like tension by lifting the front and rear edges of the canvas with one finger.

Rollers Binding

If a roller binds at both ends, adjust the tie rods or braces until the proper distance between the "A" frame is obtained. If a roller binds at the sprocket or gear end only, adjust the box at that end. It has been improperly inserted or the wrong box has been used.

Roller Wrapping

This is a trouble sometimes found at the front end of the inside platform roller. If the wrapping is composed of short straws, the outside end of the platform is higher than the inside, resulting in short straws being cut off and getting beneath the canvas on the next trip. If the wrapping is composed of green stuff mostly, raise the machine or tilt up a little.

Heavy Draft

Beside resulting from the use of poor lubrication and too tight chains, heavy draft will result from the bull wheel being entered in the quadrants at an angle. See No. 1 of above precautions for assembling.

Side Draft

Side draft or "dragging" of the platform is most often caused by grain wheel difficulties. In old machines see that the roller bearings are in good repair and not badly gummed up. If the grain wheel has been twisted out of alignment, side draft will result. On new machines the grain wheel leans slightly toward the platform, that is, the rim of the wheel is usually about one-half to one inch nearer the platform roller at the front side than at the rear. A fast horse on the outside will often give the operator the erroneous idea that side draft exists.

Difficulty in Getting Into the Grain

If a tongue truck is used and you cannot cut a full swath without the grain horse walking in the grain, set the tongue truck wheels to lean a trifle toward the grain. For difficulty in keeping out of the grain, reverse the adjustments.

Shaped Bundles

Badly shaped bundles in good grain are caused by improper manipulation of levers. One of the farmer's chief difficulties in binder operation is his refusal to use wisely the means of efficiency which the manufacturer has provided—namely, the levers. I cannot emphasize too strongly the necessity of constant lever manipulation in a constantly varying condition of grain. Down grain leaning toward or away from the platform can be picked up by the proper manipulation of the reel, and in passing from short to tall grain, or vice versa, not only the reel, but also the butter and binder head should be shifted.

Badly shaped bundles in very short grain, or in down grain leaning toward the elevators, is one of the most difficult troubles to remedy. If the grain is very short, lower the reel sufficiently to throw the straws well back upon the canvas where the butts will not be retarded by the incoming straw. This adjustment is especially valuable on 8-foot binders working in very short grain; but if resorted to, the operator must use good judgment. If this method fails the operator will have to resort to the methods employed with down grain leaning toward the elevators. Corrugate the steel grain retarder, which is supplied with most binders, starting at about the center of the retarder and making the bends larger and sharper as they approach the elevator end of the retarder. Then run the platform as nearly level as possible. If these corrugations fail to retard the heads sufficiently to permit the straw being delivered to the elevator canvases parallel to the slats, replace the retarder with one of the ropes with which twine ball bales are tied. Secure the center of this rope to the outside frame of the platform so that the two ends will play across the canvas about 4 to 6 inches apart and lie under the straw as it is thrown back onto the platform. If

this rope retarder fails, tie knots in the two ropes at intervals of about 8 inches. This procedure will usually retard heads sufficiently to improve greatly a bad condition.

When short grain is approached many operators will habitually pull back the butter instead of moving the binder-head to the front. This practice is to be discouraged because it is the cause for much dissatisfaction with the slat butter. An invariable rule for the butter's position is: Run the butter as near perpendicular to the deck roller as possible. If this rule is observed the head will have to be shifted and some of the trouble from uneven or angled butts can be avoided.

Badly shaped bundles in long, tangled grain can be improved by loosening all the grain checks over the deck and adjusting the head to tie a smaller, looser bundle.

Choking Down

Sometimes in heavy, tangled grain, and often in flax, the head cannot discharge a bundle and the whole machine is stopped by "choking down." The remedy is found in adjusting the head to tie a smaller, looser bundle, and in loosening the tension on the compressor spring.

Broken Reel Slats

This is a trouble sometimes common in very short grain with binders which do not carry outside reel supports. It is caused by the reel whipping down onto the platform parts when the machine is badly jarred or when it lunges. The trouble is not frequent in high grain because the reel can be run at a safe distance from the guards. I advise the operator to tack a 6-inch strip of canvas or linoleum along each reel slat. The reel proper can then be raised. This canvas will take the place of the slat in forcing the grain onto the platform and will give when the reel is whipped down onto the guards.

Directions for Setting Up

The following general outline for assembling binders will be found helpful if used in conjunction with the pictures shown in the direction papers.

1. Unpack box of small binder parts and place the platform on this box.
2. Run bull wheel into quadrants. Place retaining bolts at lower ends of quadrants.
3. Attach raising and lowering device.
4. Attach main frame to platform. (With Deering binders attach main frame to platform before placing the bull wheel).
5. Attach braces between main frame and platform.
6. Place bull chain and tightener.
7. Attach transport truck castings to main frame.
8. Build front "A" frame.
9. Attach rear "A" frame loosely.
10. Place lower elevator rollers, deck roller, tie rods and braces to "A" frames, then tighten rear "A" frame.
11. Square lower elevator.
12. Attach goose neck.
13. Put transport trucks in place and grease the axles.
14. Build upper elevator.
15. Square upper elevator.
16. Attach bundle carrier supports.
17. Attach binder head supports.
18. Place binder head.
19. Attach shifting lever and connections to binder head.
20. Attach deck.
21. Attach butter.
22. Attach grain shield.
23. Attach deck cover.
24. Attach reel jack, supports, levers and shaft.
25. Attach outside divider and grain wheel.
26. Reel arms and slats.
27. Place reel-driving mechanism.
28. Accessories.

Binder Head and Knotter Troubles

The general impression that binder head and tying troubles are very perplexing arises from the fact that the binder head is probably the least understood of any part of agricultural machinery—the gas engine not being excepted. As a matter of fact, however, these troubles are very simple if studied singly. Each trouble has its symptoms, each symptom gives an indication, and from these indications the causes for the trouble can readily be determined if the farmer will spend in thought only a small part of the time which he so often wastes by his "hit and miss" method of adjustment.

Fig. 1 shows a part of the trouble-making mechanism of a common binder head. All makes of heads are very similar and the functions of the various parts are the same, though the parts themselves may vary in shape and location. We can refer this discussion then to all makes of heads.

Discharge Arms Fail to Revolve Completely or Fail to Start

This is a dog trouble. The dog is that mechanism which momentarily engages the head with the continuous motion of the dog driver on the packer shaft. A moment's thought and reference to Fig. 1 will recall how the dog, when released by the stop arm, drops down into the path of the revolving dog drivers and remains there until forced back out of engagement with the packer shaft by the return of the stop arm. A dog spring causes the dog to

move when released. If this spring is weak, broken or lost, the trouble under discussion will result. The remedy of course is to supply a new dog spring.

Discharge Arms Revolve by Jerky Motion

This is caused by wear on the striking faces between the dog and dog driver. Slipping results and the remedy is to supply new parts.

Discharge Arms Revolve Continually

This may be caused by (a) the dog being out of time, or by (b) the dog slipping past the stop arm. At this point a word should be said about timing.

Fig. 1.

It will be noticed that every working part of a binder head, except the packers, works in a certain definite relation with all other moving parts. The dog, stop arm, needle, disc, bills and discharge arms all work at a certain moment in relation to each other. If this relation is broken one or more parts are said to be out of time.

The relation between the dog and stop arm is maintained by the bevel gears between the dog and binder head countershaft. If the operator has occasion to remove the dog and does not take special care to mesh the gears properly when he replaces it, the dog will be out of time with the stop arm, as stated under cause (a) above, and the discharge arms on most heads will revolve continually. To remedy the trouble, time the dog as follows: Hold the discharge arms at their usual position of rest; force the dog back against its spring as far as possible, and then slip the whole dog casting into place so that the faces of the stop arm and dog just meet. If any play exists between the stop arm and dog after the gearing is meshed, adjust further as directed below under "Dog Driver Striking Dog."

Cause (b), the dog slipping past the stop arm, becomes effective when the striking faces of the dog and arm become worn beveled to such an angle that the dog can raise the stop arm enough to pass around a second and perhaps a third time. If the condition is not particularly bad, the discharge arms will make a second revolution only occasionally, and in such event a small bundle closely following a large one is the result. If the construction of the stop arm is such that its striking face cannot be given a half turn, then supply a new dog and stop arm. If the repair must be made without supplying new parts, file the striking faces of the dog and arm to their original shape, and then take up the play between the two by adjusting the tier shaft lock.

Dog Drive Continually Striking Dog

This trouble is often encountered in old binders and is due to (a) the dog being out of time, to (b) poor setting of the tier shaft lock, or to (c) extreme wear in the binder head gears. Cause (a) has been discussed under the preceding trouble. Cause (b) can be remedied by setting the tier shaft lock closer to the cam wheel. Of course, this cause for the trouble cannot exist on those binder heads which carry the lock within the tier shaft cam wheel. It refers only to the adjustable locks which attach to the head frame just behind the cam wheel. Cause (c) can be remedied by adjusting the lock or by lengthening the stop arm. If the lock is not of the adjustable type, or if the stop arm cannot be adjusted, see if the dog gear can be advanced one cog. If all of the methods fail, such new gears will have to be supplied as will eliminate the play between the dog and the tier shaft.

Discharge Arms Not Set Tight

The causes and remedies for this trouble are the same as those of the preceding paragraph.

Very Small Bundles

In good grain very small bundles are caused by the dog being out of time. See cause (a) under "Discharge Arms Revolve Continually." An occasional small bundle in long, tangled grain is usually the result of the head being tripped by the weight of the preceding bundle which has not "cleaned," or been cleared from the head. Adjust the binder to tie a neater, smaller bundle.

Bundles Too Tight or Too Loose

There seems to be a prevailing idea, especially among the older farmers, that the proper way to change the tightness of the bundles is to tighten or loosen the twine tension on the twine can. This is an erroneous idea and it is up to the dealers to get their customers out of the habit. The twine tension should be just tight enough to keep the slack in the twine back out of the way of the moving parts of the binder head, but it should allow the twine to feed freely to the needle. If the twine tension is tightened in hopes of producing a tighter bundle, serious tying and needle troubles will result as stated below. The tightness of the bundle should be affected only by tightening or loosening the trip spring. A tight trip spring will require more straw to overcome its tension and hence the

bundle will be tighter when cast than the bundle resulting from a loose trip spring. A common type of trip spring is shown in Fig. 1.

Every binder carries a spring whose function is the same as the one shown, though the springs may differ in shape and in location. Operators should also remember that the size of the bundle can be varied independent of the tightness by moving the compressor arm toward or away from the needle.

Knotter Head Troubles

Fig 2 shows the disc and knotter bills of a common knotter head. Every knotter head, with the possible exception of one make, is very similar to

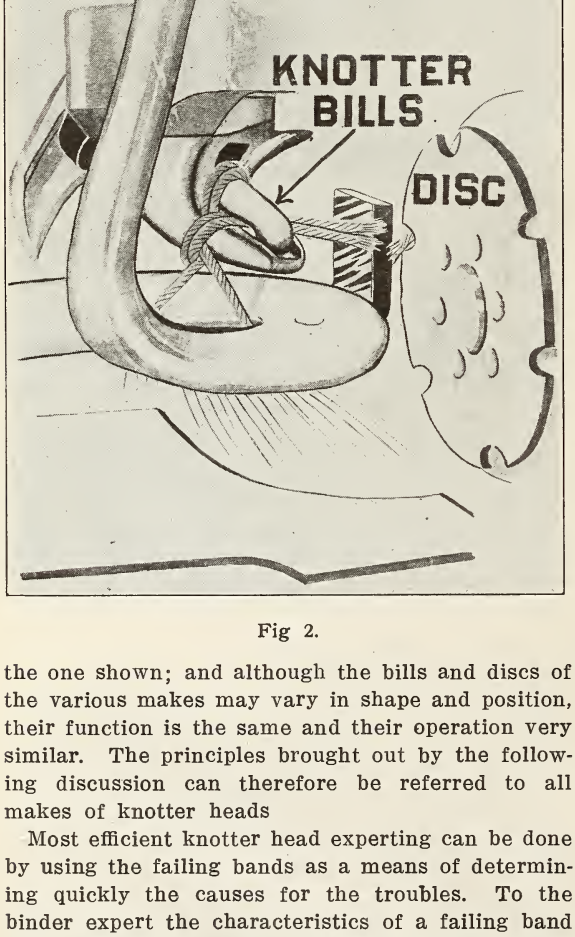


Fig 2.

the one shown; and although the bills and discs of the various makes may vary in shape and position, their function is the same and their operation very similar. The principles brought out by the following discussion can therefore be referred to all makes of knotter heads

Most efficient knotter head experting can be done by using the failing bands as a means of determining quickly the causes for the troubles. To the binder expert the characteristics of a failing band and the place where the band is found are indications of a certain trouble, just as the symptoms of a disease are indications by which the doctor diagnoses the case.

Good Twine Must Be Used

The following discussion does not take poor twine into consideration. Twine which is not reasonably uniform in thickness will cause both disc and knotter troubles which cannot be discussed systematically. If the operator persists in using poor twine he is bound to have continued trouble. Thread the machine with standard twine and then adjust as directed below until the mechanical troubles are remedied. If the farmer then insists upon continuing with poor twine he must work out his own salvation.

If a binder misses enough bundles to give positive assurance that the knotter head or needle is out of adjustment, stop the machine as soon as the next trouble bundle is cast, find the band and study as follows by referring to Fig. 3, which shows the appearance of nine bands which have resulted from the most common knotter head and needle troubles.

Knotter Troubles Shown by Bands

Band 1—Found clinging to the bills with the free end cut off square. This condition indicates that the twine disc (a common form of which is shown in Fig. 2) is too loose and the twine tension on the twine can is too tight. The condition has probably resulted from a slightly worn disc and the operator's attempt to make a tight bundle by screwing down the twine tension on the twine can. What really happens is that twine is pulled from the disc instead of from the twine can when the needle advances, and a single knot is tied at the needle end of the band. Loosen the twine tension on twine can. If the trouble is not abated, tighten the disc spring slightly. Emphasis must again be placed upon the rule: Do not attempt to affect the tightness of the bundle with the twine tension.

Band 2—Similar to band 1 in appearance, but found with the bundle instead of on the bills. Sometimes this band will not pull loose until the shocker picks up the bundle. In either case the band will be found as shown. This condition may result from any of the following causes: (a) Disc too loose but twine tension perfect. When the knotter bills revolve in a properly adjusted head it will be noticed that they must pull a little twine from the disc in order to form a loop about themselves. If the disc is too loose, as in the trouble under discussion, the disc end of the twine will be pulled entirely ont of the disc by the bills, which then proceed to tie a simple knot around this free end. In other words, a slip noose is tied around the bundle. When the bundle spreads as it is cast the slip noose pulls out. Tighten the disc spring.

At this point warning must be given to make all disc spring and knotter bill spring adjustments gradually. The average operator will usually give the controlling set screws a full turn each time he attempts an adjustment. Such procedure is the cause for failure to effect a remedy. Give the set screws of these springs not more than a quarter of a turn each time a change must be made.

If the trouble cannot be overcome by tightening the disc spring inspect the disc for wear. The disc will have to be replaced if badly worn. If band No. 2 occurs regularly with each fourth, fifth, sixth or seventh bundle, look for wear in one notch of the disc.

The band under discussion occurs most frequently from disc troubles as discussed under cause (a). If the remedies stated fail, the expert should look further as follows: (b) The bills and bills shaft may have dropped down slightly due to wear on under side of bills pinion. This carries the upper bill cam roller away from its track and the upper bill is therefore not forced open as far as it should be. Also the cam roller may have failed to turn and having become worn lop-sided it adds to the trouble. The lower bill then is not only low due to wear in the pinion, but the upper bill is not more than half open, the result being that the upper bill occasionally noses in between the strands and grasps the lower one only. If the bills shaft is loose due to wear under the pinion, file a washer down thin and place under pinion. If the upper bill cam roller is worn badly, add new parts. (c) On those heads in which the disc is driven by a plunger, the disc may be out of time—that is, the receiving notch of the disc may not be in the proper position to receive the needle end of the band. As a result the strands will be separated and the upper bill will miss the upper strand of the twine as in cause (b). Time the disc by lengthening or shortening the plunger. The disc should come to rest with a notch close to the twine holder. (d) A very loose or broken twine tension on the twine can may be the cause for the twine not being stretched tightly across the bills.

Band 3—This band is found on the bills, with the free end ragged and crushed. The twine tension on the twine can is too tight and the disc is also too tight. The disc is tight enough to crush and weaken the twine where it enters the disc. Then when needle advanced the twine broke at the disc before the tension on the twine can would give.

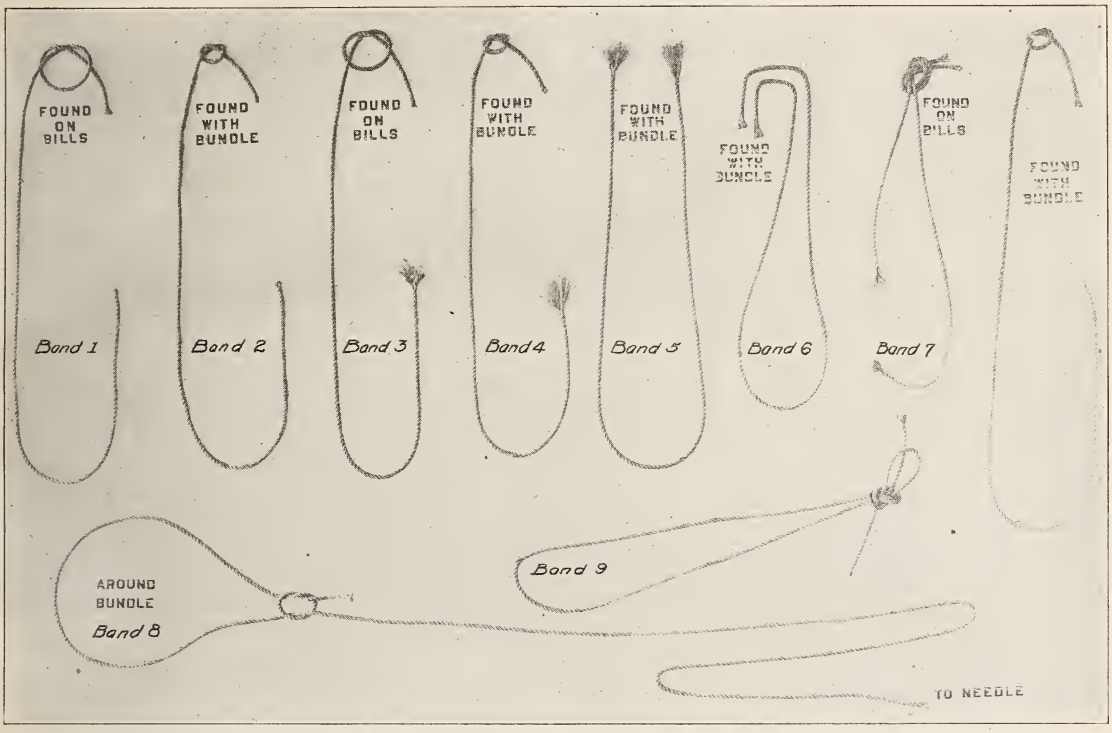


Fig. 3.

As with band No. 1, the bills tied a simple knot which is not stripped from the bills. Loosen the twine tension on the twine can. If this does not remedy the trouble, loosen the disc spring slightly. Note that this band is distinguished from band No. 1 by the condition of its free end.

Band 4—Similar to band No. 3, but found with the bundle instead of on the bills. The twine tension is perfect, but the disc spring is too tight. The behavior of this band is similar to band No. 2, except that the band is broken at the disc instead of being pulled out of the disc by the bills. See discussion under band No. 2. Loosen disc spring.

Band 5—This band is found with the bundle and has both of its ends crushed and ragged. The twine tension is perfect, but the disc is very tight. The trouble is usually the result of the operator's ten

dency to overdo adjustments by giving the disc spring set screw one or more complete turns. The disc is so tight that it refuses to yield twine to the bills, which simply break both ends of the band at the disc as they revolve. The remedy is obvious.

Band 6—Found with the bundle and both ends are bent, showing that the knot was formed, but not completed. The following causes may have been responsible for the trouble: (a) The knotter bill spring may be too loose and the bills have, therefore, failed to pull the ends of the band through the loop into a knot, or the bills may have failed to hold the ends until the knot was pulled sufficiently tight. In either case the band failed when the bundle spread. Tighten the bills' spring. (b) The "hump" on the under side of the upper bill may be badly worn. The function of this hump is to hook the ends of the band through the loop around the bills. If this hump is badly worn, sufficient pressure cannot be brought to bear upon the bills by the bills' spring, and we have the same effect as a loose spring would give. If the remedy for cause (a) is not effective, and the hump seems badly worn, file in behind the hump with a rat-tail file until the under side of the bill is a little more similar in shape to a new bill. Leave no rough place in the metal and file off edges and corners. But very little filing will be necessary. If this does not remedy the trouble, new bills and the bills' shaft will have to be supplied.

Band 7—This band will sometimes result when the bills are very tight and the machine is producing very loose bundles. It results from the stripper pulling the band up from below the breast plate instead of pulling the knot off the bills. Loosen the bills' spring slightly. If this does not remedy the trouble, the machine will have to be set to tie a tighter bundle. This trouble may also result from a badly worn cam roller on the stripper arm. If this cam roller has become worn lop-sided the stripper arm may not be forced far enough to pull the loop off the bills and the band will be broken, as shown by the discharge arms forcing out the bundle. Supply a new stripper arm complete.

Band 8—With this trouble a slip noose is tied around the bundle and the twine extends from the cast bundle to the eye of the needle. The needle has failed to place the needle end of the band in the disc due to any of the following causes: (a) The eye of the needle may be badly worn back and the needle cannot advance far enough to carry the twine to the disc. Such extreme wear is due to operator's attempt to make a tight bundle by tightening the twine tension. If the needle does not carry a special wearing piece, which can be renewed, a new needle will have to be supplied. On some machines it may be found possible to advance the needle slightly without causing binding.

The needle should advance until it just touches or is a hair's breadth from the breast plate or stripper arm. Turn the discharge arms over by hand and notice how far the needle advances. If it could advance further without hitting the breast plate or stripper, shorten the needle pitman. This may relieve the trouble, and in such event the purchase of a new needle may not be necessary. On some machines a "slow" needle is possible, and is the result of the operator having lengthened the needle pitman to cause the needle point to drop below the deck. Inspect and adjust as stated above. The needle point on most machines protrudes slightly above the deck when the needle is at rest. Such position is correct. (b) There may be some obstruction at or in the disc.

It often happens, especially in damp or green grain, or where burdock leaves, plantain, corn stalks or heavy clover give trouble, that the needle cannot quickly pierce the material on the deck and will bring trash up to the disc. This trash will cause the disc to miss the twine. If the needle point is rusty, polish it; or if dull, sharpen it. If this does not remedy the trouble, nothing can be done further to eliminate the trouble except to cut the straw higher. (c) Disc may be out of time. Time as stated at (c) under band No. 2.

Band 9—This is a perfect band and perfect knot. It is shown here with trouble bands because so many farmers think that the knot is imperfect and complain because it is an apparent waste of twine. The bow knot simply includes in the bow the short piece of twine which is cut loose and lost by those machines which tie a hard knot. The bow knot is not the cause for a material loss of twine and there is strong indication that it will stand the shockers' handling better than the hard knot.

Miscellaneous Tying Troubles

Twine wrapping above the bills cam is usually caused by a very loose or broken twine tension on the twine can.

Many knots snarled about the bills are caused by the operator having failed to look for trouble soon enough. The operator should not fret because a loose bundle is cast occasionally, and it is entirely impractical for him to stop to look for trouble until he is sure that he has it. But if he is certain that something is wrong, the quickest, surest method is to stop as soon as the next bundle fails and examine conditions. It is folly to try to locate a disc or knotter trouble after a second bundle has been cast. Thread the disc and start the machine again so that the first failing bundle may be worked upon in each trial.

To avoid a complication of tying troubles which cannot be adequately analyzed in this brief discussion, warning should be given about placing new knotter heads on tier shafts. Great care must be

exercised to get a new knotter head frame into the exact position of the old head. In other words, care must be taken to get the flattened portions of the disc and bills' pinions just close enough to the cam wheel so that these pinions will not permit lost motion and will not cut into the cam wheel.

Common Mower Troubles

In discussing machine troubles it is necessary to mention all of the causes for any particular trouble. Some of these causes and the remedies will seem very simple and useless to mention, but a wide experience in the field has taught that the simplest causes are those which are often overlooked by some farmers and experts.

Heavy Draft

Heavy draft in the mower is caused by (a) poor lubrication, (b) a dull sickle, or (c) non-alignment. The remedies for causes (a) and (b) will be obvious to the farmer, but the remedy for cause (c) is often overlooked and not readily understood. The sickle and pitman should work in a straight line with one another as shown at 3 in Fig. 1. If the outer end of the cutter bar has dropped back, as shown at 1 in Fig. 1, some of the power is consumed by the increased friction on the inside shoe parts. This increased friction causes increased draft, but it does not cause side draft as is often supposed.

The fact that non-alignment does not often occur in mowers of less than three or four season's usage, except in machines subjected to unusual strains, tends to prove that non-alignment is usually caused by wear in the hinge joints between the cutter bar and mower frame.

Many mowers now carry special aligning adjustments by which the outer end of the cutter bar can be brought ahead into line with the pitman. Such adjustments are so placed that they change the position of either the inside shoe in respect to the yoke or the yoke in respect to the push and drag bars. Such adjustments are successful aligning adjustments, for they change the angle between the cutter bar and pitman at its apex, namely, in the hinge joints. Adjustments which do not change this angle at its apex are not successful aligning arrangements and should not be resorted to. The

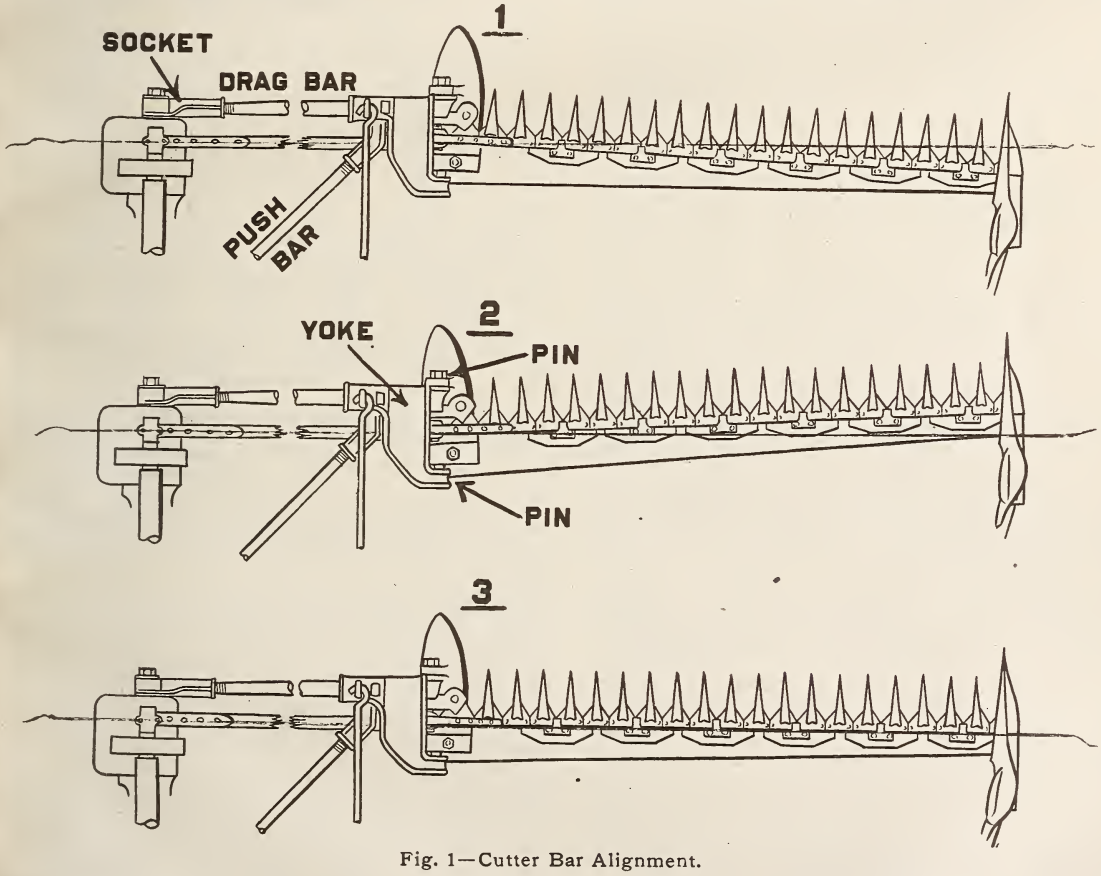


Fig. 1—Cutter Bar Alignment.

cutter bar shown at 1 in Fig. 1 cannot be properly aligned by screwing the socket further onto the drag bar nor can it be aligned by lengthening the push bar alone. If the push bar can be lengthened and the drag bar shortened at the same time, aligning can be accomplished to some extent; but the common notion that the adjustment of one of these bars will accomplish aligning is not only erroneous, but the practice of shortening the drag bar is also a dangerous one, inasmuch as it affects "centering," as will be discussed later.

Mowers which do not carry a special aligning adjustment can often be aligned sufficiently by replacing the worn parts with new ones. New inside shoe pins alone will sometimes remedy the trouble. If this method fails and if it seems impractical to advise the purchase of a new yoke or new inside shoe, then the problem of aligning becomes more difficult, but if necessary it can be accomplished by bushing either the front or rear pin hole in the yoke. This method should be attempted only by the good mechanic. To illustrate the process, let us suppose that we are to align the cutter bar at 1 in Fig. 1 by bushing the rear pin hole in the yoke. Remove the rear pin only and carry the outer end of the cutter bar ahead until it is in line with the pitman as tested by a string stretched across the two as shown at 3 in Fig. 1. Sighting through the rear pin hole will now show that the shoe hole is a little out of line with the yoke hole. With a round file, file the yoke hole until the pin can be placed snugly through the two holes without drawing the cutter bar back out of alignment. Then bush up the yoke hole opposite the place where filed with carefully fitted sheet iron of the proper thickness to make the pin fit snugly. Seats should be filed into the yoke so that the bushing can be properly seated to keep its place. This may seem a delicate and laborious process, but it is in fact quite simple if a little care is exercised.

The cutter bars in most new machines are set a little ahead. This is good practice in the long run and should not be objected to by the purchaser.

The farmer should also keep in mind the fact that in many mowers the alignment is materially affected by the tilt of the cutter bar. Some farmers will suddenly discover non-alignment and begin to complain. The operator has been compelled to tilt down. This is a little trick that most mowers have and that it should not be considered serious. Mowers which carry special aligning adjustments can be quickly lined at different tilts.

Uneven Stubble and Side Draft

These troubles are by far the most common and are due to poorly adjusted cutter bar parts. A properly adjusted cutter bar is one of the most delicate and yet one of the most abused parts in agricultural machinery. In discussing these troubles let us remember that the principle of the cutter bar is the same as that of a pair of shears. If the blades of shears are held close together, a clean cut can very easily be made; but loose shears will permit the material to be cut to wedge between the blades where it is crushed or chewed off, thus causing binding. So it is with mower cutter bar parts; if the sickle sections are held down into very close proximity with the ledger plates of the guards (shown in Fig. 2) the stalks can be very easily cut, but the

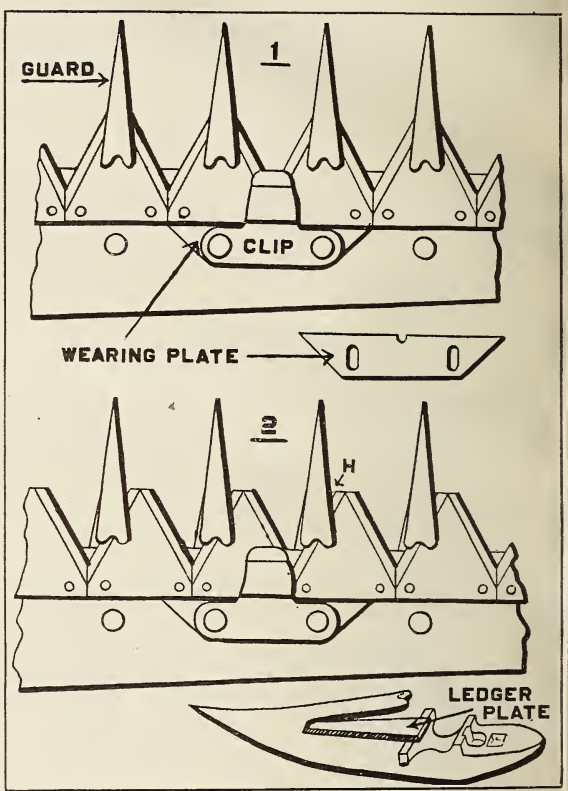


Fig. 2—Sickle Registering Properly and Improperly.

moment the stalks are permitted to force the sickle away from the ledger plates the grass begins to wedge between the two cutting surfaces, where it is chewed and crushed off, or held until pulled off as the cutter bar moves to the front. This failure to cut clean not only causes extra draft, but it is the primary cause for side draft, because the stalks drag back on the cutter bar, producing resistance at one side of the tongue the same as we produce it by pulling back on the grass stick. Side draft cannot help but result from such a condition of the cutter bar and the remedy for the trouble usually lies wholly in reach of the farmer himself if he will obtain such new parts as may be necessary to replace badly worn clips, wearing plates and ledger plates.

It is interesting to note here that a properly adjusted 8-foot mower is considered to work with as little side draft as a 5-foot cut. This tends to show

that the usual objection of side draft in the wide cuts is founded upon experience with poorly adjusted cutter bars, for if the operator allows side draft to exist of course it will become more noticeable in the wide-cut machines.

The causes for uneven stubble and side draft are: (a) guard or guards being out of alignment, (b) badly worn clips, (c) loose sickle sections or guards, or (d) sickle not centering.

Cause (a) is very common. The manufacturer is extremely careful to have the ledger plates in line when the mower leaves the factory, for he considers that this is one very essential point in good mower construction. The machine is not used ten days, however, before one or more guards have been bent up or down. If a guard is bent down, its ledger plate is carried away from the sickle and the shearing ability of the two parts greatly impaired. If a guard is bent up, it forces the sickle off the ledger plates of the adjacent guards and a still worse condition exists. Sight along the bottom of the guards at a point about an inch from the tips, then with a hammer drive back into line any guard which is found bent up or down. The guards are malleable and should be hit on the under or upper side about an inch and a half from the point. To be sure, this is not a very delicate means of aligning guards, but it is all that is practical to do to a part that will be so abused by the average operator. If this method results in a broken guard, the farmer should not feel particularly chagrined, for a broken guard that can be replaced is better by far than a badly bent guard.

If the clips shown in Fig. 2 wear sufficiently to allow the sickle to rise from the ledger plates, trouble (b) is in evidence and can be remedied by bending the clips down slightly by tapping with a hammer. If this method is used, great care must be exercised not to cause binding. Place one hand on the sickle head and then after each hammer blow move the sickle to see that binding has not resulted. If a clip has been bent down too far it can be brought back by forcing a cold chisel between it and a sickle section. The surest method for clip repair is to place new clips. If the sickle sections have become grooved by the clips, it may be necessary to bend down new clips after same are placed. Of course, the method of bending down clips cannot be used on cutter bars in which both old and new sickles are used. On such cutter bars the only safe procedure is to supply new clips, and these clips must remain adjusted for the newest sickle. Emphasis should again be placed on the necessity of care to prevent binding. The extra draft due to sickle binding may very easily become more objectionable than side draft.

Cause (c) or uneven stubble and side draft resulting from a loose sickle or guard can be detected easily by long and ragged stubble left at any particular point along the bar, or by the usual rattle of the loose parts. The remedy is obvious.

Cause (d), or sickle not centering, is a cause for uneven stubble which is often misunderstood and overlooked. At the termination of the sickle's "out" and "in" stroke, the points of the sickle sections should come to rest in the center of the guards as shown at 1 in Fig. 2. Such a sickle is said to "register" or "center" correctly. At the termination of the "in" stroke, if the sickle comes to rest as at 2 in Fig. 2, the sickle is "off center" and the grass at H will remain uncut until the sickle has again begun its "in" stroke. It can readily be seen that such a condition will cause uneven stubble, though this trouble alone will not necessarily cause side draft with old sickle bars.

There are two common causes for non-registering. Attempts to align the cutter bar by lengthening or shortening the drag bar will throw the sickle off of center. Conversely, if the sickle is off center it can be centered by the drag bar adjustment. Hence the sickle shown at 2 in Fig. 2 can be made to register by lengthening the drag bar which will force the cutter bar to the right irrespective of the sickle and pitman. Thus the danger of attempting to align the mower by the drag bar socket, as discussed under heavy draft, becomes evident, and it should be remembered that such adjustment is to be used to effect centering only.

The second common cause for non-registering is the use of a pitman which is too long or too short. It often happens that the farmer will buy a new pitman stick only, with the idea that it is a simple matter to rivet on the pitman socket and pitman head. What he really does in most cases is to miss measurements by some fraction of an inch and when the job is completed his sickle is off center. Farmers should purchase the whole pitman new, or use great care in getting the rivet holes in the right place to give the proper length to the pitman. The farmer should not attempt the task unless all of the broken parts of the old pitman are at hand from which he may secure the proper dimensions to be maintained. On the old styles of mowers which carry iron pitmans, centering of the sickle can be very quickly accomplished by screwing the pitman in or out of the socket or pitman head. It is obvious that care must be taken to maintain the proper length when an iron pitman is welded.

The practice of replacing nicked ledger plates and sickle sections with new ones is to be recommended.

Ledger plates will remain in good condition for a considerable length of time if the guards are kept in line and the sickle is forced to work close to the ledger plates where it belongs. If new ledger plates are placed under a poorly adjusted sickle they will be short lived, hence why not strike with

all effort directly at the root of the trouble rather than simply to supply parts which instead of being the cause for the difficulty are only destroyed as the result of the trouble. Old ledger plates in properly aligned guards under a sharp and properly adjusted sickle will usually give greater satisfaction in the long run than new plates under a poorly adjusted knife.

Broken Knives

This troublesome and deceiving difficulty is caused by badly worn clips and wearing plates in the inside shoe. As the pitman forces the sickle out there is pressure downward on the sickle head. As the pitman draws the sickle in there is a pull upward on the head. These forces cause considerable wear on the clips and on the wearing plates in the inside shoe. When these parts have become sufficiently worn to permit play, the sickle head is flopped up and down, and this slight but continual bending of the sickle rib at the end of the sickle head reinforcement results in a break across the outside rivet hole just as one can sever a wire by continually bending it at one point. The remedy is to supply new wearing plates and clips in the inside shoe. In extreme cases it may be found necessary to supply a new sickle head also. Just why sickle breaking is more frequent in light cutting than in heavy work is a widely disputed question, but it seems evident that light cutting increases the flopping of the head and aggravates the trouble by virtue of the fact that a team generally walks faster in light cutting than in heavy work.

It is often claimed that non-alignment causes sickle breaking. This may be true to a certain extent, but non-alignment of the sickle is more of an indirect than a direct cause, for the first thing that non-alignment will do is to cause excessive wear on the inside shoe parts.

A badly worn pitman box at the crank wheel and a beaten crank shaft bushing behind the crank wheel will increase the danger of broken sickles. Objectionable wear in these parts can be detected by the familiar rattle when the mower is at work or by a looseness that can be found by hand testing. The remedy is obvious, and inasmuch as wear in these parts will permit objectionable lost motion at all times, it is well to supply a new pitman box before greater trouble results.

Other Troubles

Undue Wear on Outside Clips and on Center Wearing Plates—This is caused by cutter bar humping or arching in the center due to lifting spring being too tight.

Cutter Bar Clogging at One Point—This results from a loose or broken sickle section or a loose guard.

Cutter Bar Parts Badly Gummed Up—This trouble is common in some conditions of clovers and is caused by using oil on knife parts where there is considerable grass juice. Grass juice and oil make a heavy gum which will increase draft. Do not use oil on those knife parts which are kept moist by the juices. It is better practice to run the sickle "dry," but care must be taken at all times to keep the sickle head well oiled.

Grass Board Bunching—This is a trouble found in heavy clovers and will sometimes cause the cutter bar to clog. Lower the grass stick.

Grass Board Failing to Throw—This is an aggravating trouble often encountered in short or slippery grass, and hard to remedy if encountered in very heavy green stuff. No general rules can be given, but relief can often be had, however, by raising the grass stick on the grass board. This will cause the grass to bunch and be rolled back out of the way in bunches. A better path is left clear by such procedure, but if bunching is a hindrance to curing, we may have to refrain from such adjustment.

Aligning the Sickle Bar—See under (c), "Heavy Draft."

Centering or Registering the Sickle—See under (d) of "Uneven Stubble."

Side Draft—See under "Uneven Stubble."

MANUFACTURERS OF MOLDBOARD TRACTOR PLOWS

NAME AND ADDRESS OF MANUFACTURER.	TRADE NAME OF PLOW.
B. F. Avery & Sons, Louisville, Ky.	B. F. Avery.
J. I. Case Plow Works, Racine, Wis.	J. I. Case.
Collins Plow Company, Quincy, Ill.	Collins.
Deere & Co., Moline, Ill.	John Deere.
Emerson-Brantingham Co., Rockford, Ill.	E-B.
Grand Detour Plow Co., Dixon, Ill.	Grand Detour.
Holt Mfg. Co., Stockton, Cal.	Caterpillar.
The Janesville Machine Co., Janesville, Wis.	Janesville.
The Killefer Mfg. Co., Los Angeles, Cal.	Killefer.
La Crosse Plow Co., La Crosse, Wis.	La Crosse.
Moline Plow Co., Moline, Ill.	Moline.
Oliver Chilled Plow Works, South Bend, Ind.	Oliver.
Parlin & Orendorff Co., Canton, Ill.	P. & O. Little Genius.
Rock Island Plow Co., Rock Island, Ill.	Rock Island.
South Bend Chilled Plow Co., South Bend, Ind.	Casaday.
Vulcan Plow Co., Evansville, Ind.	Vulcan.

MANUFACTURERS OF TRACTOR DISK PLOWS

NAME AND ADDRESS OF MANUFACTURER.	TRADE NAME OF PLOW.
J. I. Case Plow Works, Racine, Wis.	J. I. Case.
Deere & Co., Moline, Ill.	John Deere.
Emerson-Brantingham Co., Rockford, Ill.	E-B.
Grand Detour Plow Co., Dixon, Ill.	Grand Detour.
Holt Mfg. Co., Stockton, Cal.	Caterpillar.
La Crosse Plow Co., La Crosse, Wis.	La Crosse.
Moline Plow Co., Moline, Ill.	Moline.
Oliver Chilled Plow Works, South Bend, Ind.	Oliver.
Parlin & Orendorff Co., Canton, Ill.	P. & O.
Newell Sanders Plow Co., Chattanooga, Tenn.	Sanders.
Towers & Sullivan Mfg. Co., Rome, Ga.	McKay.

PLOW SPECIFICATIONS ON FOLLOWING PAGES.

TRACTOR PLOWS

Trade Name of Plow	No. of Plow Bottoms	Type of Plow Bottoms	Width of Bottom	Kind of Lift
1—B. F. Avery	2 or 3	Tex-St-T & S-Sod	14″	Power
2—J. I. Case Heavy Duty	4	All Types	14″	Power
3—J. I. Case Med. Duty	3 or 4	All Types	14″	Power
4—J. I. Case Enicar	2 or 3	All Types	12″ or 14″	Power
5—Collins	2 or 3	St-T & S	12″ or 14″	Power
6—Collins	2 or 3	Sod	12″	Power
7—J. D. Pony No. 5	2 or 3	All Types	12″ or 14″*	Power
8—J. D. Pony No. 6	3 or 4	All Types	12″ or 14″*	Power
9—J. D. Pony No. 100	4	St-T & S-Sod-Bl Land	14″	Power
10—J. D. Power Lift	4, 5, 6, 7, or 8	All Types	14″	Power
11—J. D. Lever Lift	4, 5, 6, 7 or 8	All Types	14″	Lever
12—J. D. Jumbo G. B.	1	Sod	24″	Lever
13—E-B No. 102	2 or 3	St-T & S-Sod	12″ or 14″	Power
14—E-B No. 103	3 or 4	St-T & S-Sod	12″ or 14″	Power
15—E-B No. 70.	4 or 5	St-T & S-Sod	14″	Engine Lift
16—E-B No. 71	4 or 5	St-T & S-Sod	14″	Engine Lift
17—E-B No. 90	6	St-T & S-Sod	14″	Automatic
18—E-B No. 33	3, 6 or 9	St-T & S-Sod	16″	Lever
19—Grand Detour Jr. 1-2	2	St-T & S-Sod	10″, 12″, 14″	Power
20—Grand Detour Jr. 2-3	3	St-T & S-Sod	10″, 12″, 14″	Power
21—Grand Detour Jr. 3-4	4	St-T & S-Sod	10″, 12″, 14″	Power
22—Grand Detour Jr. 4-5	5	St-T & S-Sod	10″, 12″, 14″	Power
23—G. D. I. B. Mdm. 15	3	St-T & S-Sod	14″	Power
24—G. D. I. B. Mdm. 20	4	St-T & S-Sod	14″	Power
25—G. D. I. B. mdm. 4	4	St-T & S-Sod	14″	Power
26—G. D. I. B. Mdm. 5	5	St-T & S-Sod	14″	Power
27—G. D. I. B. Mdm. 6	6	St-T & S-Sod	14″	Power
28—G. D. I. B. Mdm. 8	8	St-T & S-Sod	14″	Power
29—G. D. 24″ Brush Brkr.	1		24″	Hand
30—Janesville	2, 3 or 4	S & S-T & S	14″	Power
31—Killefer 18″ Depth	4	Stubble and Sod	16″	Screw and Hand Wheel
32—Killefer 18″ Depth	3	Stubble and Sod	16″	Screw and Hand Wheel
33—Killefer 16″ Depth	4	Stubble and Sod	14″ or 16″	Screw and Hand Wheel
34—Killefer 16″ Depth	3	Stubble and Sod	14″ or 16″	Screw and Hand Wheel
35—Killefer 16″ Depth	2	Stubble and Sod	14″ or 16″	Screw and Hand Wheel
36—LaCrosse No. 22 Lt.	2	St-T & S-Sod	14″	Power
37—La Crosse No. 23 Lt.	3	St-T & S-Sod	14″	Power
38—La Crosse No. 2 M. L.	2	St-T & S-Sod	14″	Power
39—La Crosse No. 3 M. L.	3	St-T & S-Sod	14″	Power
40—La Crosse No. 5 M. L.	4	St-T & S-Sod	14″	Power
41—La Crosse I. B. Hvy.	4	St-T & S-Sod	14″	Power
42—Moline No. 10	3 or 2	St-T & S-Sod	10, 12, 14, 16	Power
43—Moline No. 20	4 or 3	St-T & S-Sod	10″, 12″, 14″	Power
44—Moline No. 3	4 or 3	St-T & S-Sod	12″ or 14″	Power
45—Moline No. 4	5 or 4	St-T & S-Sod	12″	Power
46—Moline Univ. No. 1	2	St-T & S-Sod	12″ or 14″	Power
47—Moline Univ. No. 2	3 or 2	St-T & S-Sod	10″	Power
48—Moline Univ. Sulky	1	St-T & S-Sod	14″, 16″, 18″	Power
49—Moline Big Dutchman	6 or 8	St-T & S-Sod	14″	Power
50—Oliver No. 78	2 or 3	St-T & S-Sod	10″, 12″, 14″	Power
51—Oliver No. 79	3 or 4	St-T & S-Sod	12″ or 14″	Power
52—No. 2 Little Genius	2 or 3	St-T & S-Sod	12″ or 14″	Power
53—No. 3 Little Genius	4	St-T & S-Sod	14″	Power
54—P. & O. Mogul	4, 5, 6 or 8	St-T & S-Sod	14″	Power
55—P. & O. Grub Brkr.	1	Sod	24″	Lever
56—P. & O. No. 4 Orch.	3 or 4	General Purpose	10″	Power
57—R. I. No. 7	2 or 3	Universal "CTX"	12″ or 14″	Power
58—R. I. No. 9	2	Universal "CTX"	12″ or 14″	Power
59—R. I. No. 12	2, 3 or 4	Universal "CTX"	12″ or 14″	Power
60—Casaday No. 1	2	St-T & S-Sod	12″ or 14″	Power
61—Casaday No. 1	3	St-T & S-Sod	12″ or 14″	Power
62—Casaday No. 2	3	St-T & S-Sod	12″ or 14″	Power
63—Casaday No. 2	4	St-T & S-Sod	12″ or 14″	Power
64—Casaday No. 3	2	St-T & S-Sod	10″, 12″, 14″	Power

*10″ Furnished for Pacific Coast trade only.

(MOLDBOARD TYPE)

Style of Hitch	Bottom Connection	Kind of Frog	Type of Share	Material Used in Bottom	Shipping Weight
1— Break Pin	Rigid	Steel	Quick Detachable	Soft Center Steel	887—1087
2— Chain	Break Pin	Steel	Bolted	Soft Center Steel	3100
3—Uni. Spring Re.	Rigid	Steel	Quick Detachable	Soft Center Steel	1575
4— Pin Release	Rigid	Steel	Quick Detachable	Soft Center Steel	700— 950
5— Pin Break	Rigid		Slip	Soft Center Steel	775—990
6— Pin Break	Rigid		Slip	Soft Center Molds and Crucible Shares	750—950
7— Bar	Break Pin	Forged Steel	Quick Detachable	Soft Center Steel	938—1098
8— Bar	Break Pin	Forged Steel	Quick Detachable	Soft Center Steel	1175—1351
9— Chain		Forged Steel	Quick Detachable	Soft Center Steel	2350
10— Chain		Forged Steel	Quick Detachable	Soft Center Steel	3183 to 5199
11— Chain		Forged Steel	Quick Detachable	Soft Center Steel	2808—4960
12— Chain		Forged Steel	Crucible	Crucible	1245
13— Bar	Rigid	Steel	Quick Detachable	Soft Center Steel	730— 930
14— Bar	Rigid	Steel	Quick Detachable	Soft Center Steel	1000—1200
15— Bar	Rigid	Steel	Quick Detachable	Soft Center Steel	1040—1250
16— Bar	Friction Slip	Steel	Quick Detachable	Soft Center Steel	1100—1270
17— Chain	Friction Slip	Steel	Quick Detachable	Soft Center Steel	4800
18— Chain	Fr. Sl. or Spr. Trip	Steel	Quick Detachable	Soft Center Steel	2690 to 6340
19— Bar	Rigid	Steel	Bolted	Soft Center Steel	750
20— Bar	Rigid	Steel	Bolted	Soft Center Steel	1000
21— Bar	Rigid	Steel	Bolted	Soft Center Steel	1400
22— Bar	Rigid	Steel	Bolted	Soft Center Steel	1900
23— Chain	Break Pin	Steel	Bolted	Soft Center Steel	1900
24— Chain	Break Pin	Steel	Bolted	Soft Center Steel	2535
25— Chain	Break Pin	Steel	Bolted	Soft Center Steel	2805
26— Chain	Break Pin	Steel	Bolted	Soft Center Steel	3630
27— Chain	Break Pin	Steel	Bolted	Soft Center Steel	4385
28— Chain	Break Pin	Steel	Bolted	Soft Center Steel	5800
29— Chain	Break Pin	Cast Steel	Bolted	Soft Center Steel	1400
30— Pin Break	Rigid	Malleable	Quick Detachable	Soft Center Steel	800—1350
31— Self-steering		Cast Steel	½" Crucible Steel	Crucible Steel	6600
32— Self-steering		Cast Steel	½" Crucible Steel	Crucible Steel	5100
33— Self-steering		Cast Steel	½" Crucible Steel	Crucible Steel	5600
34— Self-steering		Cast Steel	½" Crucible Steel	Crucible Steel	4800
35— Self-steering		Cast Steel	½" Crucible Steel	Crucible Steel	2000
36— Pin Break	Rigid	Steel	Quick Detachable	Soft Center Steel	1027
37— Pin Break	Rigid	Steel	Quick Detachable	Soft Center Steel	930
38— Pin Break	Rigid	Steel	Quick Detachable	Soft Center Steel	960
39— Pin Break	Rigid	Steel	Quick Detachable	Soft Center Steel	1260
40— Pin Break	Rigid	Steel	Quick Detachable	Soft Center Steel	1200
41— Chain	Rigid	Steel	Quick Detachable	Soft Center Steel	3650—6600
42— Univer. Adj.	Rigid	Steel	Quick Detachable	"Acme" or Crucible	600—900
43— Univer. Adj.	Rigid	Steel	Quick Detachable	"Acme" or Crucible	700—1100
44— Univer. Adj.	Rigid	Steel	Quick Detachable	"Acme" or Crucible	1200
45— Vert. Adj.	Rigid	Steel	Quick Detachable	"Acme" or Crucible	1600
46— Vert. Adj.	Rigid	Steel	Quick Detachable	"Acme" or Crucible	700
47— Vert. Adj.	Rigid	Steel	Quick Detachable	"Acme" or Crucible	900
48— Vert. Adj.	Rigid	Steel	Quick Detachable	"Acme" or Crucible	600
49— Univer. Adj.	Friction Break	Steel	Quick Detachable	"Acme" or Crucible	3500
50— Bar Pin Break	Rigid	Steel and Mal.	Quick Detachable	Steel and Chilled	900—1150
51— Bar Pin Break	Rigid	Steel and Mal.	Quick Detachable	Steel and Chilled	1445
52— Bar Rig. Lat.	Rigid	Malleable	Quick Detachable	Soft Center Steel	805 to 1026
53— Bar Rig. Lat.	Rigid	Malleable	Quick Detachable	Soft Center Steel	1450
54— Chain	Rigid	Malleable	Quick Detachable	Soft Center Steel	3030—6800
55— Chain			Special	Soft Center Steel	2000
56— Bar	Break Pin	Malleable	Quick Detachable	Soft Center Steel	1026—1340
57— Universal	Break Pin	Steel		Soft Center Steel	1010—1200
58— Universal	Rigid	Steel		Soft Center Steel	700
59— Universal	Break Pin	Steel		Soft Center Steel	1075—1460
60— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1240
61— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1440
62— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1625
63— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1850
64— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1200

TRACTOR PLOWS

Trade Name of Plow	No. of Plow Bottoms	Type of Plow Bottoms	Width of Bottom	Kind of Lift
65—Casaday No. 3	3	St-T & S-Sod	10″, 12″, 14″	Power
66—Casaday No. 4	3	St-T & S-Sod	10″, 12″, 14″	Power
67—Casaday No. 4	4	St-T & S-Sod	10″, 12″, 14″	Power
68—Vulcan No. 41	1, 2 or 3	St-T & S-Sod	12″, 14″, 16″	Power

TRACTOR PLOWS

Trade Name of Plow	No. of Discs	Diameter of Discs	Width of Cut
1—B. F. Avery & Sons' Tractor Disc	2, 3 or 4	24″ or 26″	9″ to 11″
2—J. I. Case Power Lift	2	24″ or 26″	6″, 8″ or 10″
3—J. I. Case Power Lift	3	24″ or 26″	6″, 8″ or 10″
4—J. I. Case Power Lift	4	24″ or 26″	6″, 8″ or 10″
5—John Deere Little Engine Disc	4 or 5	24″	8″ or 10″
6—John Deere Light Tractor Disc	3, 4 or 5	24″	10″
7—John Deere Big Engine Disc	6 or 8	24″	8″ or 10″
8—John Deere Light Tractor Disc	3, 4 or 5	24″	8″ or 10″
9—E-B No. 104	4 or 5	24″ or 26″	30″to 40″
10—E-B No. 106	5 or 6	24″ or 26″	30″to 40″
11—E-B No. 32	6, 12 or 18	24″ or 26″	30″to 40″
12—E-B No. 36B	4 or 5	24″ or 26″	30″to 40″
13—Grand Detour 2-3	2 or 3	24″	8″ or 10″
14—Grand Detour 3-4	3 or 4	24″	8″ or 10″
15—La Crosse Light Tractor	2	24″	7″ to 9″
16—La Crosse Light Tractor	3	24″	7″ to 9″
17—La Crosse Light Tractor	4	24″	7″ to 9″
18—La Crosse Light Tractor	5	24″	7″ to 9″
19—La Crosse Light Tractor	6	24″	7″ to 9″
20—La Crosse Montana	4	24″	6″ to 10″
21—La Crosse Montana	5	24″	6″ to 10″
22—La Crosse Montana	6	24″	6″ to 10″
23—La Crosse Montana	7	24″	6″ to 10″
24—La Crosse California Beeter	2	26″	8″ to 10″
25—La Crosse California Beeter	3	26″	8″ to 10″
26—La Crosse California Beeter	4	26″	8″ to 10″
27—La Crosse California Beeter	5	26″	8″ to 10″
28—La Crosse Texas Beeter	3	28″	8″ to 10″
29—La Crosse Texas Beeter	4	28″	8″ to 10″
30—La Crosse Texas Beeter	5	28″	8″ to 10″
31—Moline Power Lift No. 20	3-2, 4-3, 5-4, or 6-5	24″	6″, 7″, 8″, 9″ or 10″
32—Moline Orchard	5 or 4	26″	9″
33—Moline Universal	2	24″	9″
34—Oliver D-42	2	24″	8″, 9″ or 10″
35—Oliver D-43	3	24″	8″, 9″ or 10″
36—Oliver D-44	4	24″	8″ or 9″
37—P. & O. Power Lift	3 or 4	24″ or 26″	7″ to 9″
38—Sanders Light	2	24″, 26″ or 28″	6″, 8″ or 10″
39—Sanders Light	3	24″, 26″ or 28″	6″, 8″ or 10″
40—Sanders Light	4	24″, 26″ or 28″	6″, 8″ or 10″
41—Sanders Regular	2	24″, 26″ or 28″	6″, 8″ or 10″
42—Sanders Regular	3	24″, 26″ or 28″	6″, 8″ or 10″
43—Sanders Regular	4	24″, 26″ or 28″	6″, 8″ or 10″
44—Sanders Regular	5	24″, 26″ or 28″	6″, 8″ or 10″
45—Sanders Regular	6	24″, 26″ or 28″	6″, 8″ or 10″
46—Sanders Regular	8	24″, 26″ or 28″	6″, 8″ or 10″
47—McKay Power Lift & Subsoiler	2 or 3	22″ or 24″	6″ to 10″
48—McKay Power Lift & Subsoiler	2 or 3	22″, 24″ or 26″	6″ to 10″

(MOLDBOARD TYPE)

Style of Hitch	Bottom Connection	Kind of Frog	Type of Share	Material Used in Bottom	Shipping Weight
65— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1400
66— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1550
67— Bar Sp. Re.	Rigid	Cast Steel	Bolted	Soft Center or Chilled	1675
68— Bar Sp. Re.	Rigid	Steel	Quick Detachable	Soft Center Steel	570 to 1070

(DISK TYPE)

	Kind of Lift	Style of Hitch	Type of Bearing	Shipping Weight
1—	Power	Bar	Ball	1400 to 1800
2—	Automatic	Bar	Chilled Dustproof	1256—1268
3—	Automatic	Bar	Chilled Dustproof	1391—1407
4—	Automatic	Bar	Chilled Dustproof	1598—1618
5—	Lever	Bar	Chilled	2584—2789
6—	Power	Bar	Chilled	1631 to 1858
7—	Lever	Bar	Chilled	3120—3530
8—	Power	Bar	Chilled	1519 to 1987
9—	Power	Chain	Ball Dustproof	1800—1900
10—	Power	Chain	Ball Dustproof	1950—2050
11—	Lever	Chain	Ball Dustproof	2970 to 7165
12—	Lever	Chain	Ball Dustproof	1550—1650
13—	Power	Bar	Chilled	1170—1343
14—	Power	Bar	Chilled	1372—1535
15—	Lever	Rigid	Chilled	1200
16—	Lever	Rigid	Chilled	1260
17—	Lever	Rigid	Chilled	1476
18—	Lever	Rigid	Chilled	1692
19—	Lever	Rigid	Chilled	1860
20—	Power	Cable	Chilled	3310
21—	Power	Cable	Chilled	3530
22—	Power	Cable	Chilled	3750
23—	Power	Cable	Chilled	3960
24—	Lever	Rigid	Chilled	1600
25—	Lever	Rigid	Chilled	1960
26—	Lever	Rigid	Chilled	3030
27—	Lever	Rigid	Chilled	3800
28—	Lever	Rigid	Chilled	3567
29—	Lever	Rigid	Chilled	4159
30—	Lever	Rigid	Chilled	4900
31—	Power	Universally Adjustable	Dustproof	1800 to 3000
32—	Hand	Universally Adjustable	Dustproof	2200
33—	Power	Vertically Adjustable	Dustproof	850
34—	Power	Bar	Chilled	1420
35—	Power	Bar	Chilled	1550
36—	Power	Bar	Chilled	1680
37—	Power	Rigid Laterally	Chilled	1450 to 1650
38—	Hand or Power	Chain	Chilled	935—1095
39—	Hand or Power	Chain	Chilled	1100—1260
40—	Hand or Power	Chain	Chilled	1320—1480
41—	Hand	Chain	Chilled	1770
42—	Hand	Chain	Chilled	1970
43—	Hand	Chain	Chilled	2080
44—	Hand	Chain	Chilled	2250
45—	Hand	Chain	Chilled	2450
46—	Hand	Chain	Chilled	2900
47—	Power	Rigid Automatic Release	Chilled	1040—1250
48—	Power	Rigid Automatic Release	Chilled	1240—1430

SPECIFICATIONS OF

Name and Address of Manufacturer.	Trade Name	Width and Height of Feed Throat	Capacity Tons per Hour.
1—Ann Arbor Mach. Co., Ann Arbor, Mich.	Ann Arbor Disc Thrower "78."	13x6	5 to 15
3—	Ann Arbor Disc Thrower "112"	16x7	10 to 30
5—Appleton Mfg. Co., Batavia, Ill.	Appleton.	12	2 to 5
6—	Appleton.	15	3 to 8
7—	Appleton.	18	7 to 16
8—	Appleton.	26	12 to 30
9—J. I. Case T. M. Co., Racine, Wis.	Case 12.	12 x 6	8 to 12
10—	Case 16.	16 x 6½	15 to 25
11—	Case 20.	20 x 7	20 to 30
12—Challenge Co., Batavia, Ill.	Challenge.	16½x14½	4 to 8
13—	Challenge.	21½x15	10 to 16
14—	Challenge.	27½x15	12 to 20
15—Jos. Dick Mfg. Co., Canton, O.	Blizzard L9-L18.	11½	4 to 6
16—	Blizzard M11-M21.	14	5 to 8
17—	Blizzard M13.	16	7 to 12
18—	Blizzard M15.	18½	10 to 15
19—	Blizzard S31.	16	9 to 15
20—	Blizzard S51.	18½	12 to 18
21—	Blizzard S71.	20½	15 to 25
22—	Blizzard S91.	23½	25 to 35
23—Ellis Keystone Agricultural Works,	Keystone.	11x6½	6 to 10
24— Pottstown, Pa.	Keystone.	14x7½	9 to 12
25—Gehl Bros. Mfg. Co., West Bend,	Gehl No. 11.	8½x 2¼	3 to 5
26— Wis.	Gehl No. 13.	11½x 2¾	4 to 6
27—	Gehl No. 15.	12½x 3¾	8 to 12
28—	Gehl No. 17.	15½x 3¾	10 to 15
29—	Gehl No. 19Sp.	17½x 3¾	12 to 20
30—	Gehl No. 20.	17½x 5	14 to 25
31—	Gehl No. 24.	21 x 5	16 to 30
32—The Globe Co., Sheboygan, Wis.	Globe 14.	120 sq. in.	8 to 15
33—	Globe 16.	140 sq. in.	12 to 20
34—W. R. Harrison Co., Massillon, O.	Tornado 111.	11 x 8	5 to 6
35—	Tornado 113.	13 x 8	6 to 8
36—	Tornado 117.	17 x10	8 to 12
37—	Tornado 120.	20 x10	12 to 20
38—International Harvester Co. of Amer-	International Type A.	16 x 6½	16 to 25
39— ica, Chicago.	International Type B.	14 x 5½	12 to 16
40—	International Type E.	11 x 4½	10 to 12
41—	International Type F.	9 x 3	3 to 6
42—	International Type G.	11 x 5	8 to 10
43—Kalamazoo Tank & Silo Co., Kala-	Kalamazoo No. 28.	8 x 6	3 to 5
44— mazoo, Mich.	Kalamazoo No. 38.	12 x 7	7 to 12
45—	Kalamazoo No. 48.	16 x 8	15 to 30
46—J. G. Kelley, Waukesha, Wis.	Kelley 15.	13 x 4⅛	12
47—	Kelley 14.	13	9 to 12
48—	Kelley 16.	15	12 to 15
49—	Kelley 20.	19	17 to 30
50—The Meili-Blumberg Co., New Hol-	Holstein 14.	12⅝x 3¾	8 to 15
51— stein, Wis.	Holstein 16	14⅝x 3¾	10 to 20
52—	Holstein 18.	16⅝x 3¾	15 to 25
53—Papec Machine Co., Shortsville, N. Y.	Papec.	19 x 6	20 to 30
54—	Papec.	16 x 4¾	12 to 20
55—	Papec.	13 x 3¼	5 to 10
56—	Papec.	10 x 3¼	2 to 5
57—Plymouth Foundry & Machine Co.,	Plymouth No. 12.	10	6 to 10
58— Plymouth, Wis.	Plymouth No. 14.	12	8 to 15
59—	Plymouth No. 16.	14	12 to 20
60—	Plymouth No. 20.	18	20 to 30
61—Rosenthal Corn Husker Co., Milwau-	Rosenthal Big 13.	8 x12	6 to 15
62— kee, Wis.	Rosenthal Big 16.	8 x14½	10 to 25
63—	Rosenthal Big 21.	8 x19½	15 to 30
64—E. W. Ross Co., Springfield, O.	Ross 30.	9 x 3¾	4 to 6
65—	Ross 40.	11 x 4¼	6 to 8
66—	Ross 50.	13 x 5	8 to 10
67—	Ross 60.	15 x 5	12 to 14
68—	Ross Cyl. Type 12.	12 x 3¼	4 to 6
69—	Ross Cyl. Type 14.	14x 3¼	6 to 8
70—	Ross Cyl. Type 16.	16 x 3¼	8 to 12

ENSILAGE CUTTERS

	Power Required	Size of Drive Pulley	Normal R.P.M. of Pulley	Belt Speed Feet per Min.	Retail Price F. O. B. Factory
1—	4 to 30	10	750	1950	
3—	6 Up	10	750	1950	
5—	6 to 10	12x6	450 to 500	1570	
6—	10 to 15	16x8	475 to 525	2090	
7—	12 to 18	18x8	475 to 525	2355	
8—	15 to 25	18x8	475 to 525	2355	
9—	12 to 15	12	650 to 800	2100	$350
10—	20 to 25	16	500 to 700	2100	420
11—	25 to 40	18	500 to 700	2100	475
12—	8 to 12	11x10	850 to 875	2450 to 2520	306
13—	12 to 16	11x10	850 to 875	2450 to 2520	370
14—	15 to 25	11x10	850 to 875	2450 to 2520	460
15—	3½ to 5	7	1100	2010	
16—	4 to 7	9	1000	2350	
17—	7 to 10	10	950	2470	
18—	8 to 12	11	900	2600	
19—	7 to 12	10	950	2470	
20—	9 to 14	11	900	2600	
21—	12 to 16	14	800	2930	
22—	14 to 18	16	700	2925	
23—	6 to 9	14	450	1650	
24—	8 to 12	16	450	1880	
25—	4 to 7	14	500 to 700	2195	
26—	5 to 8	14	500 to 700	2195	
27—	7 to 10	14	500 to 700	2195	
28—	10 to 12	14	500 to 700	2195	
29—	12 to 15	14	500 to 700	2195	
30—	14 to 18	14	500 to 700	2195	
31—	15 to 20	14	500 to 700	2195	
32—	9 to 12	14 or 16	550 to 600	2195 to 2510	
33—	12 to 20	14 or 16	550 to 600	2195 to 2510	
34—	6	6 or 8	1000	1570 to 2100	360 List
35—	8	6 or 8	1000	1570 to 2100	380 List
36—	10 to 12	8 or 10	1100 to 1250	2625 to 3250	500 List
37—	10 to 15	8 or 10	1100 to 1250	2625 to 3250	560 List
38—	20 to 25	14x 9	500 to 700	2200	
39—	15 to 20	12x 9	700 to 800	2200	
40—	10 to 15	10x 8	800 to 900	2200	
41—	4 to 6	8x 6	800 to 1000	2200	
42—	8 to 10	10x 8	800 to 900	2200	
43—	4 to 6	6x 6			
44—	8 to 10	8x 8			
45—	12 to 14	8x10			
46—	8 to 10	12 to 18	600		300
47—	9 to 12	12 to 18	550		315
48—	12 to 16	12 to 18	550		350
49—	16 to 20	12 to 18	550		475
50—	5 to 8	12 to 16	600		
51—	6 to 10	12 to 16	600		
52—	10 to 12	12 to 16	600		
53—	20 to 30 Gas	14x8	600 to 700	2200 to 2560	
54—	14 to 20 Gas	12x8	600 to 700	1885 to 2200	
55—	6 to 10 Gas	10x6	600 to 700	1560 to 1820	
56—	3 to 6 Gas	10x6	600 to 700	1560 to 1820	
57—	10	16x8	500	2090	
58—	12	18x8	500	2090	
59—	15	18x8	500	2090	
60—	20	20x8	600	3140	
61—	8 to 14	8 to 14	600 Up		
62—	12 to 16	8 to 14	600 Up		
63—	14 to 20	8 to 14	600 Up		
64—	4 to 6	8	700	1470	
65—	8 to 10	11	800	2300	
66—	10 to 12	11	800	2300	
67—	12 to 15	14	800	2930	
68—	8 to 10	15	550	2200	
69—	10 to 12	15	550	2200	
70—	20	15	550	2200	

SPECIFICATIONS OF

Name and Address of Manufacturer.	Trade Name	Width and Height of Feed Throat	Capacity Tons per Hour.
71—	Ross Cyl. Type 18.	18 x 3¼	12 to 15
72—	Ross Cyl. Type 20.	20 x 3¼	15 to 20
73—	Ross Cyl. Type 22	22 x 4½	18 to 25
74—	Ross Cyl. Type 24.	24 x 4½	18 to 25
75—The I. B. Rowell Co., Waukesha,	Rowell No. 14.	14 x 5	8 to 12
76— Wis.	Rowell No. 16.	16 x 5	10 to 15
77—	Rowell No. 18.	18½x 6	15 to 20
78—	Rowell No. 20.	20½x 6	20 to 25
79—	Rowell No. 22.	22½x 6	25 to 40
80—Silo Specialty Mfg. Co., Clinton, Ia.	Silage King.	13 x 5	10 to 12
81—	Silage King.	15 x 5	14 to 16
82—The Silver Mfg. Co., Salem, O.	Ohio 60.	11	5 to 7
83—	Ohio 90.	13	7 to 10
84—	Ohio 150.	15	12 to 15
85—	Ohio 200.	17	15 to 20
86—Smalley Mfg. Co., Manitowoc, Wis.	Smalley 10.	10	3 to 4
87—	Smalley 12.	12	5 to 9
88—	Smalley 14.	14	7 to 11
89—	Smalley 16.	16	9 to 13
90—	Smalley 18.	18	15 to 20
91—	Smalley 20.	20	20 to 30
92—	Smalley 26.	26	25 to 40
93—Stover Mfg. & Engine Co., Freeport,	Stover.	10x4 (Cylinder)	4 to 6
94— Ill.	Stover.	12x4 (Cylinder)	6 to 8
95—	Stover.	14x4 (Cylinder)	8 to 10
96—	Stover.	16x5 (Cylinder)	15 to 20
97—	Stover.	18x5 (Cylinder)	20 to 25
98—	Stover.	10x4 (Flywheel)	3 to 5
99—	Stover.	12x4 (Flywheel)	5 to 7
100—	Stover.	14x4 (Flywheel)	7 to 10
101—Swayne, Robinson & Co., Richmond,	Money Maker 40.	9 x4½	2 to 4
102— Ind.	Money Maker 50.	9 x6	4 to 6
103—	Money Maker 75.	13 x6	6 to 12
104—	Money Maker 90.	15 x6	10 to 15
105—	Money Maker 105.	15 x7	12 to 18
106—Wilder Strong Implement Co., Mon-	Whirlwind D.	10¼x3½	3 to 6
107— roe, Mich.	Whirlwind E.	12¼x5	6 to 10
108—	Whirlwind F.	14 x5¼	10 to 15
109—	Whirlwind G.	17¼x5⅞	15 to 20
110—	Whirlwind H.	19 x6¼	25 Up

SPECIFICATIONS OF

Name and Address of Manufacturer	Trade Name	Number of Rolls	Capacity Bu. per Hour
1—Advance-Rumely Thresher Co., Inc.,	Advance.	6	50 to 75
2— La Porte, Ind.	Advance.	8	75 to 100
3—Appleton Mfg. Co., Batavia, Ill.	Appleton.	2 (Cutter Head)	12 to 25
4—		2 (Shredder Head)	12 to 25
5—	Appleton.	4 (Cutter Head)	40 to 60
6—		4 (Shredder Head)	40 to 60
7—	Appleton.	6 (Cutter Head)	60 to 90
8—		6 (Shredder Head)	60 to 90
9—	Appleton.	8 (Cutter Head)	80 to 125
10—		8 (Shredder Head)	80 to 125
11—International Harvester Co. of Amer-	Deering.	2	15 to 25
12— ica, Chicago.	Deering.	4	30 to 50
13—	Deering.	6	60 to 70
14—	McCormick.	4	30 to 50
15—	McCormick.	6	60 to 75
16—	McCormick.	8	80 to 100
17—	McCormick.	10	80 to 100
18—The Maytag Co., Newton, Ia.	Maytag.	4	70
19—	Maytag.	8	100
20—Rosenthal Corn Husker Co., Milwau-	Rosenthal No. 1.		20 to 40
21— kee, Wis.	Rosenthal Special 4.		30 to 50
22—	Rosenthal Medium 4		40 to 80
23—U. S. Wind Engine & Pump Co., Ba-	U. S. Standard.	2	15 to 25
24— tavia, Ill.	U. S. Standard.	4	35 to 60
25—	U. S. Standard.	6	60 to 100

ENSILAGE CUTTERS

	Power Required	Size of Drive Pulley	Normal R.P.M. of Pulley	Belt Speed Feet per Min.	Retail Price F. O. B. Factory
71—	20	15	550	2200	
72—	24	15	550	2200	
73—	30	15	550	2200	
74—	30	15	550	2200	
75—	8 to 10	14x6	500 to 700		$297 Full Eqpt.
76—	10 to 12	16x8	500 to 700		319 Full Eqpt.
77—	12 to 16	16x8	500 to 700		377 Full Eqpt.
78—	14 to 20	16x8	500 to 700		414 Full Eqpt.
79—	16 to 24	16x8	500 to 700		451 Full Eqpt.
80—	12	14x7	600	2195	$165
81—	14 to 16	14x8½	600	2195	180
82—	6 to 8	10x6	600 to 800	2080	155
83—	8 to 10	10x6	600 to 800	2080	180
84—	14 to 18	12x8	650 to 700	2200	230
85—	16 to 20	12x8	650 to 700	2200	275
86—	5 to 6	10	550	1430	
87—	8	12 or 14	600		
88—	9	14 or 16	600		
89—	12	14 or 16	600		
90—	16	16 or 18	600		
91—	20	16 or 20	600		
92—	24	16 or 20	600		
93—	6 to 10	8x 6	650	1365	
94—	8 to 12	8x 8	650	1365	
95—	10 to 14	8x 8	650	1365	
96—	14 to 20	14x 8	650	2380	
97—	16 to 25	14x 8	650	2380	
98—	6 to 10	8x 6	800 to 1100	2310 Max.	
99—	8 to 12	10x 8	800 to 1100	2860 Max.	
100—	10 to 14	10x 8	800 to 1100	2860 Max.	
101—	3½ to 5	7x 6	900 to 1100	2015 Max.	
102—	6 to 10	7x 6	800 to 1100	2015 Max.	
103—	8 to 15	10x 8	700 to 1000	2600 Max.	
104—	12 to 20	10x 8	600 to 900	2340 Max.	
105—	12 to 25	10x 8	600 to 900	2340 Max.	
106—	3 to 6	7 to 12	900		155
107—	6 to 10	7 to 12	900		200
108—	10 to 15	8 to 14	800		255.20
109—	12 to 18	8 to 14	800		324
110—	18 to 22	8 to 14	750		408

CORN HUSKERS

	Power Required	Size of Drive Pulley	Normal R.P.M. of Pulley	Belt Speed Feet per Min.	Price F. O. B. Factory
1—	14	9½x10½	1000	2500	$ 775 List
2—	16	9½x10½	1000	2500	1050 List
3—	4 to 8	12 x 8	650	2040	
4—	8 to 12	8 x 8	1000	2100	
5—	6 to 10	12 x 8	650	2040	
6—	10 to 14	8 x 8	1000	2100	
7—	10 to 15	12 x 8	650	2040	
8—	14 to 19	8 x 8	1000	2100	
9—	15 to 20	12 x 8	650	2040	
10—	19 to 24	8 x 8	1000	2100	
11—	6 to 8	7¼ x 8	1200	2400	
12—	10 to 12	7¼ x 8	1200	2400	
13—	15 to 20	7¼ x 8	1200	2400	
14—	12 to 15	8 x 8	1000	2080	
15—	15 to 20	8 x 8	1000	2080	
16—	20 to 25	9 x 9	1000	2400	
17—	20 to 25	9 x 9	1000	2400	
18—	15	8	1100	2300	850
19—	20	8	1100	2300	1200
20—	6 to 8	8	1000	2100	
21—	10 to 15	8	1000	2100	
22—	15 to 20	8	1000	2100	
23—	4 to 8		700	2500	
24—	6 to 10		700	2500	
25—	8 to 15		700	2500	

SPECIFICATIONS OF

Name and Address of Manufacturer	Trade Name	Size Grinding Mill	Capacity Bu. per Hour.
1—Acme Wagon Co., Emigsville, Pa.	Acme.	12-in. Stones	8 to 20
2—Appleton Mfg. Co., Batavia, Ill.	Appleton.	No. 8 American	50 to 70
3—	Appleton.	No. 22 American	20 to 60
4—	Appleton.	No. 23 American	30 to 75
5—Baker Mfg. Co., Evansville, Wis.	Baker.	10	20 to 50
6—The C. S. Bell Co., Hillsboro, O.	Model.	6	8 to 15
7—	Model.	8	20 to 30
8—	Model.	10	30 to 50
9—The N. P. Bowsher Co., South Bend,	Bowsher.	Comb. No. 2½	12 to 30
10— Ind.	Bowsher.	Comb. No. 3	12 to 40
11—	Bowsher.	Comb. No. 4	15 to 40
12—	Bowsher.	Comb. No. 7	15 to 60
13—	Bowsher.	Comb. No. 8	20 to 60
14—	Bowsher.	Comb. No. 9	40 to 125
15—	Bowsher.	Comb. No. 10	50 to 175
16—	Bowsher.	Vert. No. 30	10 to 30
17—	Bowsher.	Vert. No. 33	15 to 35
18—	Bowsher.	Vert. No. 66	20 to 70
19—Dempster Mill Mfg. Co., Beatrice, Neb.	Dempster.	No. 1 Burr	5 to 25
20—	Dempster.	No. 2 Roller Burr	2 to 8 per hp. hr.
21—	Dempster.	No. 4 Roller Burr	2 to 8 per hp. hr.
22—Duplex Mfg. Co., Superior, Wis.	Jewell.		30
23—Frank Hamachek, Kewaunee, Wis.	Giant.	8	20 to 40
24—	Giant.	12	40 to 80
25—International Harvester Co. of Amer-	International Type B.	8	
26— ica, Chicago.	International Type B.	10	
27—	International Type C.	8	
28—	International Type D.	8	
29—	International Type D.	10	
30—	Meadows Mill No. 3.	20	5 to 12
31—	Meadows Mill No. 4.	24	6 to 18
32—	Meadows Mill No. 5.	30	10 to 25
33—Letz Mfg. Co., Crown Point, Ind.	Letz 11-X.	10	15 to 40
34—	Letz 111-X.	10	15 to 40
35—	Letx 20-X.	10	25 to 60
36—	Letz 120-X.	10	25 to 60
37—	Letz 30.	10	40 to 70
38—	Letz 40.	12	50 to 150
39—	Letz 22 Roughage.	12	Depends
40—	Letz 88 Roughage.	10	Depends
41—National Tubular Axle Co., Emigsville, Pa.	National.	12-in. Stones	8 to 20
42—New Holland Machine Co., New Hol-	New Holland No. 6.	6	4 to 20
43— land, Pa.	New Holland No. 6½.	6½	8 to 40
44—	New Holland No. 10.	8	12 to 60
45—	New Holland No. 12.	10	25 to 90
46—	New Holland No. 3.	12	40 to 125
47—Sheldon Engine & Sales Co., Waterloo, Ia.	Sheldon.	10	25 to 60
48—Smalley Mfg. Co., Manitowoc, Wis.	Smalley Alfalfa.	20	2½ tons
49—	Smalley Alfalfa.	26	3¾ tons
50—	Smalley Alfalfa.	36	5 tons
51—	Smalley Alfalfa.	40	5½ tons
52—Spartan Mfg. Co., Pontiac, Ill.	Corn Belt.	3A	25 to 50
53—	Corn Belt.	5	40 to 60
54—	Corn Belt.	5B	20 to 60
55—	Corn Belt.	7A	75 to 100
56—	Corn Belt.	10B	25 to 100
57—Sprout, Waldron & Co., Muncy, Pa.	Monarch.	12, 16 & 20	6 to 50
58—Stover Mfg. & Engine Co., Freeport,	Stover No. 40.	8	3 to 6 per hp. hr.
59— Ill.	Stover No. 45.	10	3 to 6 per hp. hr.
60—	Stover No. 48 Alfalfa.	8	3 to 6 per hp. hr.
61—	Stover No. 49 Alfalfa.	10	3 to 6 per hp. hr.
62—	Stover No. 71 Shuck.	8	3 to 6 per hp. hr.
63—	Stover No. 70 Shuck.	10	3 to 6 per hp. hr.
64—	Stover Comminuter	12	3 to 5 tons alfalfa per day
65—	Stover Comminuter	18	6 to 12 tons alfalfa per day

LARGE FEED GRINDERS

	Power Required	Size of Drive Pulley	Normal R.P.M. of Pulley	Belt Speed Feet per Min.	Retail Price F. O. B. Factory
1—	4 to 10	8 x 6			
2—	10 to 14	12 x 8	900 to 1200	3770 Max.	
3—	4 to 10	9 x 6	450 to 900	2120 Max.	
4—	10 to 20	12 x 8	450 to 900	2825 Max.	
5—	8 to 15	12	650 to 700	2200 Max.	
6—	3 to 8				
7—	8 to 15				
8—	15 to 25				
9—	6 to 8	10 x 6½	400 to 600	1560 Max.	$ 72 List
10—	6 to 8	6½ x 6½	1350	2295	72 List
11—	8 to 10	6½ x 6½	1350	2295	85 List
12—	8 to 12	8½ x 8½	1050	2330	112 List
13—	10 to 15	8½ x 8½	1050	2330	130 List
14—	15 to 18	10 x10	1050 to 1200	3120 Max.	185 List
15—	16 to 25	12 x12	1050 to 1200	3770 Max.	245 List
16—	5 to 10	16 x 6½	225 to 275	1150 Max.	64 List
17—	6 to 12	16 x 6½	275 to 375	1570 Max.	90 List
18—	10 to 15	18 x 8½	300 to 400	1880 Max.	125 List
19—	1½ to 4	6 x 4	550 to 1150		15
20—	4 to 8	9 x 6	100 R.P.M. per hp.		60
21—	6 to 15	10 x 8	65 R.P.M. per hp.		75
22—	6 Up	8	600 to 1200	2520 Max.	21.75
23—	4 to 8	8	700 to 1000	2100 Max.	40
24—	8 to 16	12	600 to 900	2825 Max.	100
25—	3 to 8	10 x 8¼	300 to 800	2000 to 2700	
26—	6 to 12	12 x 8¼	400 to 750	2000 to 2700	
27—	3 to 12	8 x 8¼	350 to 1350	2000 to 2700	
28—	4 to 10	10 x 8¼	400 to 1000	2000 to 2700	
29—	6 to 12	12 x 8¼	450 to 900	2000 to 2700	
30—	6 to 8	12 x 6	550	1700	
31—	10 to 15	14 x 6	500	1800	
32—	15 to 20	16 x 8	400	1700	
33—	6 to 12	8x 6 to 16x 6	450 to 700		
34—	6 to 12	8x 6 to 16x 6	450 to 700		
35—	10 to 15	8x 8 to 16x 8	500 to 700		
36—	10 to 15	8x 8 to 16x 8	500 to 700		
37—	12 to 20	8x 8 to 18x 8	500 to 700		
38—	18 to 25	8x12 to 18x12	500 to 700		
39—	15 to 25	8x12 to 18x12	500 to 700		
40—	6 to 12	8x 6 to 16x 6	450 to 700		
41—	4 to 10	8 x 6			
42—	1 to 5	8 x 4	500 to 1000	2100 Max.	
43—	2 to 8	10 x 5	500 to 900	2340 Max.	
44—	5 to 10	14 x 5	500 to 800	2930 Max.	
45—	8 to 14	14 x 6	500 to 700	2560 Max.	
46—	10 to 20	14 x 8	500 to 700	2560 Max.	
47—	8 to 15	8	600 to 800	1680 Max.	40
48—	15 to 30	16 to 20	600		
49—	20 to 40	16 to 20	600		
50—	25 to 50	16 to 20	600		
51—	30 to 60	16 to 20	600		
52—	5 to 10		250 to 500		66
53—	25		300 to 700		78
54—	25		300 to 700		120
55—	40		300 to 700		105
56—	40		300 to 700		145
57—	6 to 30		800 to 2000		
58—	6 to 12	10 x 6	800	2080	
59—	12 to 25	10 x 8	1000	2600	
60—	8 to 12	10 x 6	800	2080	
61—	12 to 25	10 x 8	1000	2600	
62—	4 to 10	18 x 6	500	2350	
63—	8 to 20	15 x 6	500	2000	
64—	6 to 12	10 x 6	850	2210	
65—	12 to 25	14 x 8	850	3110	

SPECIFICATIONS OF

Name and Address of Manufacturer	Trade Name	Size Grinding Mill	Capacity Bu. per Hour
66—United Engine Co., Lansing, Mich.	United.	8	20 to 30
67—	United.	10	30 to 50
68—Wilson Bros., Easton, Pa.	Wilson.	No. 10	5 to 8 tons per day
69—	Wilson.	No. 11	18 tons per day
70—	Wilson.	No. 14	50 tons per day

SPECIFICATIONS

Name and Address of Manufacturer.	Trade Name	Size Bale Chamber	Capacity Tons per Hour
1—Admiral Hay Press Co., Kansas City,	Admiral.	14x18	2 to 3
2— Mo.	Admiral.	16x18	2½ to 3½
3—	Admiral.	17x22	4 to 6
4—Ann Arbor Machine Co., Ann Arbor,	Ann Arbor 20.	14x18	1½ to 2½
5— Mich.	Ann Arbor 20.	16x18	1½ to 2½
6—	Ann Arbor 20.	17x22	2½ to 3
7—	Ann Arbor 60.	14x18	2 to 4
8—	Ann Arbor 60.	16x18	2 to 4
9—	Ann Arbor Columbia.	14x18	2 to 3½
10—	Ann Arbor Columbia.	16x18	2 to 3½
11—	Ann Arbor Columbia.	17x22	2 to 7
12—	Ann Arbor Columbia.	18x22	2 to 7
13—Belleville Baler Co., Belleville, Ill.	Belleville.	14x18	3
14—	Belleville.	16x18	3½ to 4
15—	Belleville.	17x22	4 to 5
16—The Burkett Mfg. Co., Columbus, O.	Burkett Junior.	14x18	
17—	Burkett Standard.	14x18	
18—	Burkett Standard.	16x18	
19—	Burkett Standard.	17x22	
20—J. I. Case T. M. Co., Racine, Wis.	Case.	14x18	3 to 4
21—	Case.	17x22	3½ to 5
22—Chattanooga Implement & Mfg. Co.,	Royal.	14x18	3
23— Chattanooga, Tenn.	Royal.	16x18	3
24—Collins Plow Co., Quincy, Ill.	Eli 108.	14x18	3 to 4
25—	Eli 108.	16x18	3 to 4
26—	Eli 108.	17x22	3½ to 4½
27—	Eli 108.	19x24	4 to 5
28—	Eli 112.	14x18	2½ to 3
29—	Eli 112.	16x18	2½ to 3
30—	Eli 160.	22x26	9 to 10
31—Emerson-Brantingham Co., Rockford,	Peerless.	17x22	4
32— Ill.	Reeves.	14x18	3
33—	Reeves.	16x18	3½
34—	Reeves.	17x22	4
35—Hartman Mfg. Co., Vincennes, Ind.	Wygant.	17x22	6
36—International Harvester Co. of Amer-	International.	14x18	2½
37— ica, Chicago.	International.	16x18	3
38—	International.	17x22	3 to 3½
39—Kansas City Hay Press Co., Kansas	K C.	14x18	2 to 4
40— City, Mo.	K C.	16x18	2 to 4
41—	K C.	17x22	2 to 4
42—New Winona Mfg. Co., Winona, Minn.	Diamond.	14x18	2 Up
43—The Ohio Cultivator Co., Bellevue, O.	Ohio.	14x18	5 to 7
44—	Ohio.	16x18	5 to 7
45—	Ohio.	17x22	5 to 7
46—Sandwich Mfg. Co., Sandwich, Ill.	Sandwich Wood Frame.	14x18	2½ to 5
47—	Sandwich Wood Frame.	16x20	2½ to 5
48—	Sandwich Wood Frame.	18x22	2½ to 5
49—	Sandwich Solid Steel.	14x18	2½ to 3½
50—	Sandwich Solid Steel.	16x18	2½ to 3½
51—	Sandwich Solid Steel.	17x22	2½ to 3½
52—Swayne, Robinson & Co., Richmond,	Money Maker.	14x18	2 to 3
53— Ind.	Money Maker.	16x18	2½ to 3½
54—	Money Maker.	17x22	2½ to 4
55—Williams Mfg. Co., Macon, Ga.	Williams.	14x18	2 to 3
56—	Williams.	16x18	2 to 3

LARGE FEED GRINDERS

	Power Required	Size of Drive Pulley	Normal R.P.M. of Pulley	Belt Speed Feet per Min.	Retail Price F. O. B. Factory
66—	6 to 12	12 x 6	450 to 500	1570 Max.	34
67—	12 to 25	12 x 8	450 to 500	1570 Max.	43.50
68—	12 to 15	17 x10	700	3115	
69—	20 to 40	20 x14	600	3140	
70—	20 to 30	17 x10	425	1790	

OF HAY PRESSES

	Power Required	Size of Drive Pulley	Normal R. P. M. of Pulley	Belt Speed Feet per Min.	Retail Price F. O. B. Factory
1—	6 Up		350		
2—	6 Up		350		
3—	8 Up		350		
4—	6 to 8	10x8	675	1750	
5—	6 to 8	10x8	675	1750	
6—	6 to 8	10x8	675	1750	
7—	6 to 12	10x8	650	1700	
8—	6 to 12	10x8	650	1700	
9—	6 to 50	14x8	600	2200	
10—	6 to 50	14x8	600	2200	
11—	6 to 50	14x8	600	2200	
12—	6 to 50	14x8	600	2200	
13—	6	38	185	1840	$500
14—	8 Up	38	185	1840	525
15—	8 Up	38	185	1840	550
16—	6 Up	14			375
17—	6 Up	14			555
18—	7 Up	14			565
19—	8 Up	14			585
20—	6	13⅜ x9¼	640	2620	650
21—	8	13⅜ x9¼	640	2620	700
22—	6	14	425	1550	562.50
23—	6	14	425	1550	562.50
24—	8 to 10	20x10	500	2600	
25—	8 to 10	20x10	500	2600	
26—	8 to 10	20x10	500	2600	
27—	10 to 12	20x10	500	2600	
28—	6 to 8	20x10	550 to 600	2875 to 3140	
29—	6 to 8	20x10	550 to 600	2875 to 3140	
30—	12 to 15	20x10	450 to 500	2350 to 2600	
31—	35	15	500	2000	
32—	25	15	500	2000	
33—	30	15	500	2000	
34—	35	15	500	2000	
35—	8	16	575	2400	
36—	6 to 12	16x7½	600	2510	
37—	6 to 12	16x7½	600	2510	
38—	6 to 12	16x7½	600	2510	
39—	8 to 30	14—16—18	375		
40—	8 to 30	14—16—18	375		
41—	8 to 30	14—16—18	375		
42—	8 Up	16x8	400	1675	
43—	8 to 20	12—14—17	550		
44—	8 to 20	12—14—17	550		
45—	8 to 20	12—14—17	550		
46—	8 to 16	44	150 to 225	1725 to 2590	
47—	8 to 16	44	150 to 225	1725 to 2590	
48—	8 to 16	44	150 to 225	1725 to 2590	
49—	6 to 8	44	150 to 225	1725 to 2590	
50—	6 to 8	44	150 to 225	1725 to 2590	
51—	6 to 8	44	150 to 225	1725 to 2590	
52—	4 to 8	13x8½	500	1700	
53—	4 to 10	13x8½	500	1700	
54—	8 to 12	13x8½	500	1700	
55—	4 to 6	26x6	240	1630	500
56—	4 to 6	26x6	240	1630	500

SPECIFICATIONS

Name and Address of Manufacturer.	Trade Name	Size Bale Chamber	Capacity Tons per Hour
57—Wirtz & Hernlon, Augusta, Ga.	Dixie.	15x19½	1½ to 3
58—	Dixie.	16x21	1½ to 3
59—Ypsilanti Hay Press Co., Ypsilanti,	Junior.	14x18	2 to 2¼
60— Mich.	Junior.	16x18	2¼ to 3
61—	Standard.	17x22	4 to 5
62—	Standard.	18x22	5 to 6
63—	Jumbo.	18x22	7 to 8

SPECIFICATIONS OF

Name and Address of Manufacturer	Trade Name	Type of Sheller	Capacity Bu. per Hour.
1—Appleton Mfg. Co., Batavia, Ill.	Appleton.	2-Hole	90 to 125
2—	Appleton.	4-Hole.	200 to 250
3—	Appleton.	6-Hole	350 to 400
4—Marseilles Works of Deere & Co., E.	No. 2½ John Deere.	2-Hole	50 to 90
5— Moline, Ill.	No. 3½ John Deere.	2-Hole	90 to 140
6—	Marseilles Cyclone.	4-Hole	160 to 250
7—	Marseilles Cyclone.	6-Hole	200 to 350
8—	No. 1 New Marseilles	Cylinder	300 to 600 husked
9—			100 to 200 snapped
10—	No. 2 New Marseilles	Cylinder	600 to 1100 husked
11—			150 to 250 snapped
12—	No. 3 New Marseilles	Cylinder	800 to 1500 husked
13—			200 to 400 snapped
14—Joliet Mfg. Co., Joliet, Ill.	Rural Ironsides.	2-Hole	65 to 100
15—	Eureka.	2-Hole	100 to 150
16—	Eureka.	4-Hole	200 to 300
17—	Eureka.	6-Hole	300 to 450
18—	New No. 1.	Cylinder	250 to 400
19—	New No. 2.	Cylinder	500 to 800
20—	New Big 4.	Cylinder	800 to 1500
21—King & Hamilton Co., Ottawa, Ill.	Ottawa F.	Cylinder	150 to 250
22—	Ottawa D.	Cylinder	300 to 500
23—	Ottawa C.	Cylinder	500 to 800
24—The Minneapolis Threshing Machine Co., Hopkins, Minn.	Minneapolis.	Cylinder	800 Up
25—Port Huron Engine & Thresher Co.,	Port Huron.	Cylinder Sr.	1200
26— Port Huron, Mich.	Port Huron.	Cylinder Jr.	750
27—	Port Huron.	Cylinder Baby	250
28—Sandwich Mfg. Co., Sandwich, Ill.	Sandwich.	Jr.	90 to 110
29—	Sandwich.	4-Hole	200 to 250
30—	Sandwich.	6-Hole	300 to 350
31—	Sandwich.	8-Hole	400 to 600
32—	Sandwich.	Nos. 5 and 7 Cyl.	800 to 1200
33—	Sandwich.	No. 1A Cylinder	200 to 250
34—Union Iron Works, Decatur, Ill.	Western 2A.	Cylinder	1200 to 1800
35—	Western 2½A.	Cylinder	700 to 1200
36—	Western 4A.	Cylinder	500 to 700

OF HAY PRESSES

	Power Required	Size of Drive Pulley	Normal R. P. M. of Pulley	Belt Speed Feet per Min.	Retail Price F. O. B. Factory
57—	6 to 8	14	450	1650	400
58—	6 to 8	14	450	1650	410
59—	6 to 8	15	500 to 600	2000 to 2400	600
60—	8 to 10	15	500 to 600	2000 to 2400	610
61—	10 to 12	15	500 to 600	2000 to 2400	690
62—	10 to 12	15	500 to 600	2000 to 2400	720
63—	12 to 14	15	500 to 600	2000 to 2400	1190

CORN SHELLERS

	Power Required	Size of Drive Pulley	Normal R.P.M. of Pulley	Belt Speed Feet per Min.	Retail Price F. O. B. Factory
1—	4 to 6	10x 6	800	2095	
2—	6 to 10	12x 6	800	2500	
3—	12 to 16	12x 8	800	2500	
4—	4 to 5	9x 6	730	1900	
5—	5 to 8	9x 6	730	2100	
6—	10	11x 8	730 to 750	2100	
7—	12	11x 8	730 to 750	2100	
8—					
9—	15 to 18	14x 8	635	2325	
10—					
11—	18 to 20	14x 8	635	2325	
12—					
13—	24 to 28	14x10	635	2325	
14—	4	8	700 to 800		
15—	6	8	1000 to 1100	2100 to 2300	$335
16—	10	8	1000 to 1100	2100 to 2300	450
17—	12	8	1000 to 1100	2100 to 2300	520
18—	15	12	700 to 750	2200 to 2350	585
19—	12 to 15 Steam	12	700 to 750	2200 to 2350	840
20—	16 Steam	14	700 to 750	2550 to 2750	950
21—	10	14 to 22	450		505
22—	25	10 to 16	800		
23—	16 Steam	10 to 16	750		
24—	16	15	700	2800	
25—	35	14	750	2750	
26—	20	12	750	2355	
27—	10	10	750	1964	
28—	6	10	800	2080	
29—	8 to 10	8	800	1680	
30—	10 to 12	8	800	1680	
31—	12 to 15	8	800	1680	
32—	16 to 20	12	800	2500	
33—	8 to 10	10	800	2080	
34—	15 to 18	20x 9	420	2200	750
35—	12 to 15	18x 9	500	2350	700
36—	10 to 12	14x 9	550	2000	600

MANUFACTURERS OF TRACTOR MATERIALS, PARTS, EQUIPMENT AND ACCESSORIES

AIR CLEANERS

Autosales Corp. of Detroit, Detroit, Mich.
Commercial Truck Co., Cleveland, O.
Donaldson Co., Inc., St. Paul, Minn.
Holley Kerosene Carburetor Co., Detroit, Mich.
Leonard Air Washer Co., Kalamazoo, Mich.
Ross-Wortham Co., McCormick Bldg., Chicago.
Stewart-Warner Speedometer Corp., 1828 Diversey Parkway, Chicago.
Stinson Tractor Co., Superior, Wis.
Wilcox-Bennett Carburetor Co., Minneapolis, Minn.

ALLOY STEELS

Carnegie Steel Co., Pittsburgh, Pa.

ALUMINUM CASTINGS

(See Castings, Aluminum).

ASSEMBLIES

Hartford Automotive Parts Co., Hartford, Conn.

AXLES

Anderson Forge & Machine Co., Detroit, Mich.
Clark Equipment Co., Buchanan, Mich.
Cleveland City Forge & Iron Co., Cleveland, O.
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Lapeer Pressed Steel Axle Co., Lapeer, Mich.
Russell Motor Axle Co., Detroit, Mich.
Spacke Machine & Tool Co., Indianapolis, Ind.
Standard Parts Co., Cleveland, O.
Tractor Parts Co., Rockefeller Bldg., Cleveland, O.
Wagner Axle Co., Anderson, Ind.

AXLE FORGINGS AND PARTS

John Obenberger Forge Co., West Allis, Wis.
J. H. Williams & Co., 107 Richards St., Brooklyn, N. Y.

AXLE STAMPINGS

Truscon Steel Co., Youngstown, O.

BABBITT METAL

I. M. Jacobson & Sons Co., Detroit, Mich.
Lumen Bearing Co., Buffalo, N. Y.
Merchant & Evans Co., 2035 Washington Ave., Philadelphia, Pa.
Muzzy-Lyon Co., Detroit, Mich.
National Lead Co., New York, N. Y.

BATTERIES (DRY CELL)

French Battery & Carbon Co., Madison, Wis.
Hi-Po Waterproof Battery Co., 1007 Atlantic Ave., Brooklyn, N. Y.
Manhattan Electrical Supply Co., 114 Wells St., Chicago.
Nungesser Carbon & Battery Co., National Carbon Co., Cleveland, O.
Universal Carbon Co., Dundee, Ill.

BATTERIES (STORAGE)

Detroit Battery Co., Detroit, Mich.
Edison Storage Battery Co., Orange, N. J.
Gould Storage Battery Co., 30 East 43d St., New York, N. Y.
V. A. Longaker Co., Indianapolis, Ind.
Perfection Storage Battery Co., 500 E. 40th St., Chicago. Ill.
Permalite Corp., Indianapolis, Ind.
Prest-O-Lite Co., Indianapolis, Ind.
Universal Battery Co., 3410 So. LaSalle St., Chicago, Ill.
Vesta Accumulator Co., 2100 Indiana Ave., Chicago, Ill.
Victor Storage Battery Co., Moline, Ill.
Willard Storage Battery Co., Cleveland, O.
Witherbee Igniter Co., Springfield, Mass.

BALLS (STEEL)

Auburn Ball Bearing Co., Auburn, N. Y.
Federal Bearings Co., Poughkeepsie, N. Y.
Hoover Steel Ball Co., Ann Arbor, Mich.

BEARING BRONZE

American Bronze Co., Berwyn, Pa.
American Foundry Co., Peoria, Ill.

Dayton Bronze Bearing Co., Dayton, O.
Ideal Bronze Co., Cleveland, O.

BEARINGS (BABBITT LINED)

Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.
Doehler Die Casting Co., Brooklyn, N. Y.
General Aluminum & Brass Mfg. Co., Detroit, Mich.

BEARINGS (BALL)

Ahlberg Bearing Co., 2636 Michigan Ave., Chicago.
Acme Ball Bearing Co., 1509 S. Michigan Ave., Chicago, Ill.
Auburn Ball Bearing Co., Rochester, N. Y.
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Ball Bearing Co., Bantam, Conn.
Bearings Co. of America, Lancaster, Pa.
The Carlson-Wenstrom Co., Philadelphia, Pa.
The Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Gurney Ball Bearing Co., Jamestown, N. Y.
Hess-Bright Mfg. Co., Philadelphia, Pa.
Hoover Steel Ball Co., Ann Arbor, Mich.
National Bearing Co., Lancaster, Pa.
New Departure Mfg. Co., Bristol, Conn.
Nice Ball Bearing Co., Philadelphia, Pa.
Norma Co. of America, 1790 Broadway, New York, N. Y.
Pruyn Ball Bearing Co., 4410 Paul St., Philadelphia, Pa.
Salisbury Ball Bearing Co., Cleveland, O.
Schatz Mfg. Co., Poughkeepsie, N. Y.
SKF Ball Bearing Co., Hartford, Conn.
Standard Parts Co., Cleveland, O.
Standard Roller Bearing Co., Philadelphia, Pa.
U. S. Ball Bearing Co., 4535 Palmer St., Chicago, Ill.

BEARINGS (MAGNETO)

Norma Co. of America, 1790 Broadway, New York, N. Y.

BEARINGS (PLAIN)

Ahlberg Bearing Co., 2636 Michigan Ave., Chicago.
Aluminum Castings Co., Cleveland, O.
American Bronze Co., Berwyn, Pa.
Bearings Service Co., Detroit, Mich.
Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.
Brass Foundry Co., Peoria, Ill.
The Bunting Brass & Bronze Co., Toledo, O.
Dayton Bronze Bearing Co., Dayton, O.
Doehler Die Casting Co., Brooklyn, N. Y.
Federal Brass Works, Detroit, Mich.
Franklin Mfg. Co., Syracuse, N. Y.
General Aluminum & Brass Mfg. Co., Detroit, Mich.
Green Engineering Co., Dayton, O.
Ideal Bronze Co., Cleveland, O.
Johnson Bronze Co., New Castle, Pa.
Milwaukee Die Casting Co., Milwaukee, Wis.
Modern Die & Tool Co., Indianapolis, Ind.
The Muzzy-Lyon Co., Ltd., Detroit, Mich.
Jos. T. Ryerson & Son, 16th and Rockwell Sts., Chicago, Ill.
Stewart Mfg. Co., Wells and Kinzie Sts., Chicago, Ill.

BEARINGS (ROLLER)

American Roller Bearing Co., Pittsburgh, Pa.
Ball & Roller Bearing Co., Danbury, Conn.
Bower Roller Bearing Co., Detroit, Mich.
Graham Roller Bearing Co., Coudersport, Pa.
Hyatt Roller Bearing Co., 2715 Michigan Ave., Chicago. Ill.
Norma Co., 1790 Broadway, New York, N. Y.
Ohio Metal Products Co., Dayton, O.
Planetary Roller Bearing Co., 29 S. LaSalle St., Chicago.
Standard Parts Co., Cleveland, O.
Standard Roller Bearing Co., Philadelphia, Pa.
Timken Roller Bearing Co., Canton, O.
Wright Roller Bearing Co., Philadelphia, Pa.

BEARINGS (THRUST)

Bantam Ball Bearing Co., Bantam, Conn.
Bearings Co. of America, Lancaster, Pa.
Iron City Products Co., Pittsburgh, Pa.
Norma Co. of America, 1790 Broadway, New York, N. Y.
SKF Ball Bearing Co., Hartford, Conn.

BELT DRUMS

Gier Pressed Steel Co., Lansing, Mich.

BELTING

Chicago Belting Co., 125 N. Green St., Chicago, Ill.
Otto E. Geisel, Philadelphia, Pa.
L. H. Gilmer Co., Philadelphia, Pa.
Graton & Knight Mfg. Co., Worcester, Mass.
Hettrick Mfg. Co., Toledo, O.
Hide, Leather & Belting Co., Indianapolis, Ind.
Jewell Belting Co., 55 Trumbull St., Hartford, Conn.
Russell Mfg. Co., Middletown, Conn.
Chas. A. Schieren Co., 30 Ferry St., New York, N. Y.

BELTS (FAN)

(See Fan Belts)

BELT FASTENERS

Flexible Steel Lacing Co., 522 S. Clinton St., Chicago, Ill.

BELT LACING (STEEL HINGE)

Flexible Steel Lacing Co., 522 S. Clinton St., Chicago, Ill.

BOLT DIES

Armstrong Mfg. Co., Bridgeport, Conn.

BOLTS AND NUTS

The Atlas Bolt & Screw Co., Cleveland, O.
Boss Nut Co., 1734 Kolmar St., Chicago, Ill.
Clark Bros. Bolt Co., Milldale, Conn.
Cleveland Wrought Products Co., Cleveland, O.
Columbus Bolt Works Co., Columbus, O.
The Ferry Cap & Set Screw Co., Cleveland, O.
Ford-Clark Co., Cleveland, O.
Hartford Machine Screw Co., Hartford, Conn.
Michigan Bolt & Nut Works, Detroit, Mich.
National Acme Co., Cleveland, O.
Permanent Products Co., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Standard Parts Co., Cleveland, O.
Steel Products Co., Cleveland, O.

BRAKE PARTS

Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.
Gier Pressed Steel Co., Lansing, Mich.
Raybestos Co., Bridgeport, Conn.
Steel Products Co., Cleveland, O.
Truscon Steel Co., Youngstown, O.

BRASS AND COPPER STRIPS

Dallas Brass & Copper Co., 223 N. Jefferson St., Chicago.

BOXES (TOOL)

(See Tool Boxes).

BRAKE LININGS

Advance Packing & Supply Co., 15 N. Franklin St., Chicago, Ill.
American Asbestos Co., Borristown, Pa.
Asbestos & Rubber Works of New Jersey, Camden, N. J.
General Asbestos & Rubber Co., Charleston, S. C.
Hide, Leather & Belting Co., Indianapolis, Ind.
H. W. Johns-Manville Co., New York, N. Y.
Raybestos Co., Bridgeport, Conn.
Russell Mfg. Co., Middletown, Conn.
Standard Woven Fabric Co., Walpole, Mass.
Staybestos Mfg. Co., 5540 Lena St., Philadelphia, Pa.
Thermoid Rubber Co., Trenton, N. J.
Wilmington Fibre Specialty Co., Wilmington, Del.
Woven Steel Hose & Rubber Co., Trenton, N. J.

BRAKE RODS

Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

BRASS PARTS

A. C. Dallas & Sons, Inc., 221 N. Jefferson St., Chicago.
Imperial Brass Mfg. Co., 519 S. Racine Ave., Chicago.
Roberts Brass Mfg. Co., Detroit, Mich.

BUSHINGS

Aluminum Castings Co., Cleveland, O.
American Bronze Corp., Berwyn, Pa.
Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.
The Bunting Brass & Bronze Co., Toledo, O.
Wm. Cramp & Son Ship & Engine Building Co., Philadelphia, Pa.
Federal Brass Works, Detroit, Mich.
Johnson Bronze Co., New Castle, Pa.
Otto Konigslow Mfg. Co., Cleveland, O.
Superior Metal Products Co., Elyria, O.

CABLE (SPECIAL TRACTOR)

Packard Electric Co., Warren, O.

CAM SHAFTS

Cleveland City Forge & Iron Co., Cleveland, O.
L. O. Gordon Mfg. Co., Muskegon, Mich.
Jackson Motor Shaft Co., Jackson, Mich.
Muskegon Motor Specialties Co., Muskegon, Mich.
John Obenberger Forge Co., Milwaukee, Wis.
Wyman-Gordon Co., Worcester, Mass.

CAM SHAFTS (FINISHED)

Jackson Motor Shaft Co., Jackson, Mich.

CANOPIES

Tractor Equipment Co., Detroit, Mich.

CAP SCREWS

Steel Products Co., Metals Welding Plant, Cleveland, O.

CARBON REMOVER

S. C. Johnson & Son, Racine, Wis.
Work Co., Racine, Wis.

CARBURETORS

Air Friction Carburetor Co., Dayton, O.
Burn Oil Device Co., Peoria, Ill.
Byrne, Kingston & Co., Kokomo, Ind.
Camden Anchor-Rockland Machine Co., Camden, Me.
Carter Carburetor Co., St. Louis, Mo.
Conservation Carburetor Co., Des Moines, Ia.
Detroit Lubricator Co., Detroit, Mich.
Ensign Carburetor Co., Los Angeles, Cal.
Federal Brass Works, Detroit, Mich.
Findeisen & Kropf Mfg. Co., 21st and Rockwell Sts., Chicago.
Generator Valve Co., 294 Taaffe Place, Brooklyn, N. Y.
The H. & N. Carburetor Co., 1675 Broadway, New York, N. Y.
Holley Kerosene Carburetor Co., Detroit, Mich.
Hoosier Sub-Carburetor Co., Indianapolis, Ind.
K. B. C. Co., 2015 Michigan Ave., Chicago, Ill.
Kerosene Burning Carburetor Co., 2015 S. Michigan Ave., Chicago.
Krice Carburetor Co., Detroit, Mich.
The Linga Co., Waukegan, Ill.
Marvel Carbureter Co., Flint, Mich.
Miller Carburetor Co., Los Angeles, Cal.
National Equipment Co., 124 S. Racine Ave., Chicago.
Stewart-Warner Speedometer Corp., 1828 Diversey Parkway, Chicago.
Sunderman Corp., Newburg, N. Y.
Stromberg Motor Devices Co., 68 E. 25th St., Chicago.
U. & J. Carburetor Co., 507 W. Jackson Blvd., Chicago.
U. S. Carburetor Co., Omaha, Neb.
U. S. Vaporizer Co., 214 State St., Boston, Mass.
Van Briggle Motor Device Co., Indianapolis, Ind.

Western Carburetor Co., Alma, Mich.
The Wheeler-Schebler Carburetor Co., Indianapolis, Ind.
Wilcox-Bennett Carburetor Co., Minneapolis, Minn.
Zenith Carburetor Co., Detroit, Mich.

CASE HARDENING

C. G. Buchanan Chemical Co., Cincinnati, O.
Myall-Wallace Co., 17 E. Austin Ave., Chicago.
Steel Improvement & Forge Co., Cleveland, O.

CASTINGS (ALUMINUM)

Aluminum Castings Co., Cleveland, O.
Dallas Brass & Copper Co., 223 N. Jefferson St., Chicago.
Gem City Smelting & Brass Castings Co., Dayton, O.
General Aluminum & Brass Mfg. Co., Detroit, Mich.
Harley Co., Springfield, Mass.
Ideal Bronze Co., Cleveland, O.
Imperial Brass Mfg. Co., 524 S. Racine Ave., Chicago.
National Bronze & Aluminum Foundry Co., Cleveland, O.

CASTINGS (BRASS)

Aluminum Castings Co., Cleveland, O.
The Bunting Brass & Bronze Co., Toledo, O.
Dallas Brass & Copper Co., 223 N. Jefferson St., Chicago.
General Aluminum & Brass Mfg. Co., Detroit, Mich.
Harley Co., Springfield, Mass.
Imperial Brass Mfg. Co., 524 S. Racine Ave., Chicago.

CASTINGS (BRONZE)

Aluminum Castings Co., Cleveland,, O.
American Bronze Corp., Berwyn, Pa.
American Metal Products Co., Milwaukee, Wis.
Clayton & Lambert Co., Detroit, Mich.
Dallas Brass & Copper Co., 223 N. Jefferson St., Chicago.
Federal Brass Works, Detroit, Mich.
General Aluminum & Brass Mfg. Co., Detroit, Mich.
Harley Co., Springfield, Mass.
Ideal Bronze Co., Cleveland, O.
Imperial Brass Mfg. Co., 524 S. Racine Ave., Chicago.
National Bronze & Aluminum Foundry Co., Cleveland, O.
Wellman Bronze Co., Cleveland, O.

CASTINGS (CYLINDER)

Standard Foundry Co., Racine, Wis.

CASTINGS (DIE)

The Aluminum Castings Co., Cleveland, O.
Doehler Die Casting Co., Court and 9th Sts., Brooklyn, N. Y.
Franklin Mfg. Co., Syracuse, N. Y.
General Aluminum & Brass Mfg. Co., Detroit, Mich.
Harley Co., Springfield, Mass.
Milwaukee Die Casting Co., Milwaukee, Wis.
Modern Die & Tool Co., Indianapolis, Ind.
Precision Castings Co., Syracuse, N. Y.
Stroh Casting Co., Detroit, Mich.

CASTINGS (GREY IRON)

Acme Steel & Malleable Iron Works, Buffalo, N. Y.
Lewis Steel Products Co., Toledo, O.
Link-Belt Co., 39th St. and Stewart Ave., Chicago.

CASTINGS (MALLEABLE)

Albion Malleable Iron Co., Albion, Mich.
American Malleable Castings Co., Marion, O.
Belle City Malleable Iron Co., Racine, Wis.
Chain Belt Co., Milwaukee, Wis.
Chicago Malleable Castings Co., 120th St. and S. Racine Ave., Chicago.
Erie Malleable Iron Co., Erie, Pa.
Link-Belt Co., 39th St. and Stewart Ave., Chicago.
Maumee Malleable Casting Co., Toledo, O.
Moline Malleable Iron Co., St. Charles, Ill.
National Malleable Castings Co., Cleveland, O.
United States Malleable Iron Co., Toledo, O.
Western Foundry Co., 3634 S. Kekzie Ave., Chicago.

CASTINGS (STEEL)

Belle City Malleable Iron Co., Racine, Wis.
Bonney-Floyd Co., Columbus, O.
Chain Belt Co., Milwaukee, Wis.
Chicago Steel Foundry Co., 37th and Rockwell Sts., Chicago.
Covel Mfg. Co., Benton Harbor, Mich.
Dayton Steel Casting Co., Dayton, O.
Electric Steel Co. of Indiana, Indianapolis, Ind.
Electric Steel Co., W. 31st and S. Wood Sts., Chicago.
S. Fair & Son, Inc., Saginaw, Mich.
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Frazier & Jones Corp., Syracuse, N. Y.
Gerlinger Steel Casting Co., Milwaukee, Wis.
Hubbard Steel Foundry Co., East Chicago, Ind.
Interstate Foundry Co., Cleveland, O.
Jewell Steel & Malleable Co., Buffalo, N. Y.
Link-Belt Co., 39th St. and Stewart Ave., Chicago.
McCord & Co., Peoples Gas Bldg., Chicago.
Michigan Steel Casting Co., Detroit, Mich.
Modern Steel Casting Co., Milwaukee, Wis.
Mt. Clemens Foundry Co., Mt. Clemens, Mich.
National Malleable Castings Co., Cleveland, O.
Northern Foundry Co., Marinette, Wis.
Ohio Steel Foundry Co. (Blackwood Steel Foundry Co.), Springfield, O.
Pelton Steel Co., Milwaukee, Wis.
Sivyer Steel Casting Co., Milwaukee, Wis.
The Standard Steel Castings Co., 616 S. Michigan Ave., Chicago.
Stroh Casting Co., Detroit, Mich.
Wehr Steel Casting Co., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.

CEILING NIPPLE CUTTERS

Armstrong Mfg. Co., Bridgeport, Conn.

CHAIN (SPECIAL TRANSMISSION CHAIN FOR TRACTORS AND MOTORS)

Baldwin Chain & Mfg. Co., Worcester, Mass.
Columbus McKinnon Chain Co., Columbus, O.
Cullman Wheel Co., 1346 Altgeld St., Chicago.
Culver-Taylor Chain Works, Detroit, Mich.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., 39th St. and Stewart Ave., Chicago.
National Chain Co., New York, N. Y.
The Whitney Mfg. Co., Hartford, Conn.

CHANNELS, ANGLES, TEES, ZEES

Carnegie Steel Co., Pittsburgh, Pa.
Interstate Iron & Steel Co., Monroe Bldg., Chicago.

CHASSIS BOLTS

Steel Products Co., Metals Welding Plant, Cleveland, O.

CHROME NICKEL STEEL

La Salle Steel Co., 2305 S. Halsted St., Chicago.

CLUTCH DISKS

Curtis Saw Co., St. Louis, Mo.
Hilliard Clutch & Machinery Co., Elmira, N. Y.

CLUTCH FACINGS

Advance Packing & Supply Co., 11 N. Franklin St., Chicago.
General Asbestos & Rubber Co., Charleston, S. C.
Hide, Leather & Belting Co., Indianapolis, Ind.
Merchant & Evans Co., Philadelphia, Pa.
Raybestos Co., Bridgeport, Conn.
Rockwood Mfg. Co., Indianapolis, Ind.
Thermoid Rubber Co., Trenton, N. J.
Wilmington Fibre Specialty Co., Wilmington, Del.

CLUTCH PARTS

Cotta Gear Co., Rockford, Ill.
Hoosier Auto Parts Co., Muncie, Ind.
Woven Steel Hose & Rubber Co., Trenton, N. J.

CLUTCHES (TRANSMISSION)

Borg & Beck Co., 914 S. Michigan Ave., Chicago.
Brown-Lipe Gear Co., Syracuse, N. Y.
Cotta Gear Co., Rockford, Ill.
A. J. Detlaff Co., Detroit, Mich.
Golden, Belknap & Swartz Co., Detroit, Mich.
Hartford Automotive Parts Co., Hartford, Conn.
Hoosier Auto Parts Co., Muncie, Ind.
W. A. Jones Foundry & Mach. Co., 1401 W. North Ave., Chicago.
Porter Machine Co., Wooster, O.
O. K. Clutch & Machinery Co., Columbus, Pa.
Merchant & Evans Co., Philadelphia, Pa.
Stoufer Mfg. Co., Minneapolis, Minn.
Strite Governor Pulley Co., Minneapolis, Minn.
Twin Disc Clutch Co., Racine, Wis.
Ward La France Truck Co., Elmira, N. Y.

CLUTCHES (POWER PULLEY)

Brown Clutch Co., Sandusky, O.
Havana Mfg. Co., Havana, Ill.
Lasure Friction Clutch Pulley Co., Watertown, Wis.
National Clutch Co., Fulton and Lincoln Sts., Chicago.
O. K. Clutch & Machinery Co., Columbia, Pa.
Strite Governor Pulley Co., Minneapolis, Minn.

COCKS (RADIATOR AND PET)

Lincoln Brass Works, Detroit, Mich.

CONNECTING RODS

Anderson Forge & Machine Co., Detroit, Mich.
C. A. S. Engineering Co., Detroit, Mich.
Cleveland City Forge & Iron Co., Cleveland, O.
Spacke Machine & Tool Co., Indianapolis, Ind.
J. H. Williams & Co., Brooklyn, N. Y.
Wyman-Gordon Co., Worcester, Mass.

COOLING SYSTEMS

The G. & C. Mfg. Co., New Haven, Conn.
Long Mfg. Co., Detroit, Mich.
Motor Cooling Systems Co., Baltimore, Md.

CONSULTING ENGINEERS

McVicker Engineering Co., Metropolitan Life Bldg., Minneapolis, Minn.
Reed & Glaser, Merchants Bank Bldg., Indianapolis, Ind.

COTTER PINS

American Cotter Pin Co., Pittsburgh, Pa.
M. D. Hubbard Spring Co., Pontiac, Mich.

COVERS (CANVAS)

Baker & Lockwood, Kansas City, Mo.
Dafoe-Eustice Co., Detroit, Mich.
Tractor Equipment Co., Detroit, Mich.

COVERS (HAND HOLE AND TRANSMISSION)

Otto Konigslow Mfg. Co., Cleveland, O.

CRANK SHAFTS

Anderson Forge & Machine Co., Detroit, Mich.
Automobile Crankshaft Corp., Detroit, Mich.
Bay City Forge Co., Erie, Pa.
Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.
Cleveland City Forge & Iron Co., Cleveland, O.
Jackson Motor Shaft Co., Jackson, Mich.
Milwaukee Forge & Machine Co., Milwaukee, Wis.
Moline Forging & Mfg. Co., Moline, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Muskegon Motor Specialties Co., Muskegon, Mich.
National Engineering Co., Saginaw, Mich.
John Obenberger Forge Co., Milwaukee, Wis.
The Wyman Gordon Co., Worcester, Mass.

CRANK SHAFTS (FINISHED)

Jackson Motor Shaft Co., Jackson, Mich.

CULTIVATORS (GARDEN TRACTOR)

Beeman Garden Tractor Co., Minneapolis, Minn.
Elderfields Reservation, Port Washington, L. I., N. Y.
Hackney Mfg. Co., St. Paul, Minn.
Middlesex Machine Co., Middletown, Conn.
New Britain Machine Co., New Britain, Conn.
Power Garden Cultivator Co., Minneapolis, Minn.
Trojan Mfg. Co., 400 Pierce St., Minneapolis, Minn.

CULTIVATORS (MOTOR)

Avery Co., Peoria, Ill.
Bailor Plow Mfg. Co., Atchison, Kan.
Emerson-Brantingham Implement Co., Rockford, Ill.
Franks Tractor-Cultivator Co., Owensboro, Ky.
International Harvester Co. of America, Chicago.
Toro Motor Co., Minneapolis, Minn.

CUTTING (FELT, RUBBER, LEATHER, CLOTH, ASBESTOS)

Advance Felt Specialty & Cutting Co., 320 S. Jefferson St., Chicago.

CYLINDERS (REGRINDING)

The Butler Mfg. Co., Indianapolis, Ind.
Green Engineering Co., Dayton, O.

DECALCOMANIA

Decalcomania Co., 20 W. Jackson Blvd., Chicago.
Meyercord Co., Chamber of Commerce, Chicago.
Palm Bros. & Co., Cincinnati, O.
Palm, Fechteler & Co., 67 5th Ave., New York.

DIFFERENTIALS

Bailey Non-Stall Differential Corp., 1124 S. Michigan Ave., Chicago.
Cullman Wheel Co., 1346 Altgeld St., Chicago.
Dorr Miller Differential Co., 90 West St., New York.
East Iron & Machine Co., Lima, O.
B. F. Everitt Co., Detroit, Mich.
Frost Gear & Forge Co., Jackson, Mich.
R. D. Nuttall Co., Pittsburgh, Pa., and Conway Bldg., Chicago.

DRILL HEADS

Automatic Machine Co., Dayton, O.

DRILLS (MACHINE)

National Automatic Tool Co., Richmond, Ind.

DRIVE PULLEYS

(See Pulleys).

DROP FORGINGS

Aborn Steel Co., New York, N. Y.
Accessory Forgings Co., Detroit, Mich.
Andrews Steel Co., Newport, Ky.
Billings & Spencer Co., Hartford, Conn.
The Champion Machine & Forging Co., Cleveland, O.
Cleveland Hardware Co., Cleveland, O.
Detroit Forging Co., Detroit, Mich.
Endicott Forging & Mfg. Co., Endicott, N. Y.
Harley Co., Springfield, Mass.
Henry & Allen, Auburn, N. Y.
Indianapolis Drop Forge Co., Indianapolis, Ind.
Ingalls-Shepard Forging Co., Harvey, Ill.
Ladish Drop Forge Co., Cudahy, Wis.
James McKay Co., Pittsburgh, Pa.
Moore Drop Forging Co., Springfield, Mass.
John Obenberger Forge Co., Milwaukee, Wis.
Owensboro Forging Co., Inc., Owensboro, Ky.
Pittsburgh Knife & Forge Co., Pittsburgh, Pa.
Strieby & Foote Co., Newark, N. J.
The Steel Improvement & Forge Co., Cleveland, O.
Transue & Williams Steel Forging Corp., Alliance, O.
Union Drop Forge Co., 358 W. Grand Ave., Chicago.
J. H. Williams & Co., 107 Richards St., Brooklyn, N. Y.
Wyman Gordon Co., Worcester, Mass.

DUST SHIELDS

Otto Konigslow Mfg. Co., Cleveland, O.

ENGINE BRACKET BOLTS

Steel Products Co., Metals Welding Plant, Cleveland, O.

EQUALIZER SHAFTS

(See Shafts, Equalizer).

EXHAUST PIPES

American Tube Co., Rockwell and 37ts Sts., Chicago.
Standard Tool & Mfg. Co., Detroit, Mich.

FAN BELTS

Advance Packing & Supply Co., 15 N. Franklin St., Chicago.
Alexander Bros., 414 N. 3rd St., Philadelphia, Pa.
J. W. Curry Co., Cincinnati, O.
Gates Rubber Co., Denver, Colo.
Otto E. Geisel, Philadelphia, Pa.
L. H. Gilmer Co., Philadelphia, Pa.
Graton & Knight Mfg. Co., Worcester, Mass.
Hide, Leather & Belting Co., Indianapolis, Ind.
Link-Belt Co., 39th St. and Stewart Ave., Chicago.
Mechanical Belt Co., St. Joseph, Mo.
U. S. Rubber Co., New York, N. Y.

FANS

Automotive Parts Co., Indianapolis, Ind.
Detroit Carrier & Mfg. Co., Detroit, Mich.
Hotz Foundry & Mfg. Co., Fremont, O.
The Oakes Co., Indianapolis, Ind.
Sparks-Withington Co., Jackson, Mich.
Standard Tool & Mfg. Co., Detroit, Mich.

FELT AND FELT CUTTING

Advance Felt Specialty & Cutting Co., 320 S. Jefferson St., Chicago.
American Felt Co., Boston, Mass.

FENDERS

Ajax Auto & Aero Sheet Metal Co., New York, N. Y.
Motors Metal Mfg. Co., Detroit, Mich.
York Corrugating Co., York, Pa.

FIBRE

American Vulcanized Fibre Co., Wilmington, Del.
Delaware Hard Fibre Co., Wilmington, Del.
Wilmington Fibre Specialty Co., Wilmington, Del.

FLY WHEEL BLANKS

Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

FORGINGS

Aborn Steel Co., 22 Clark St., New York.
American Forge & Machine Co., Canton, O.
The Champion Machine & Forge Co., Cleveland, O.
Cleveland City Forge & Iron Co., Cleveland, O.
Columbus Bolt Works Co., Columbus, O.
Ladish Drop Forge Co., Cudahy, Wis.
Milwaukee Forge & Machine Co., Milwaukee, Wis.
Moline Forging & Mfg. Co., Moline, Ill.
Moore Drop Forging Co., Springfield, Mass.
John Obenberger Forge Co., Milwaukee, Wis.
Owensboro Forging Co., Owensboro, Ky.
Pittsburgh Knife & Forge Co., Pittsburgh, Pa.
Savage Arms Corp., Sharon, Pa.
Steel Improvement & Forge Co., Cleveland, O.
The Wyman Gordon Co., Worcester, Mass.
United Alloy Steep Corp., Canton, O.

FORGINGS (HEAT TREATED)

Cleveland City Forge & Iron Co., Cleveland, O.

FRAMES (SPECIAL STEEL, FOR TRACTORS)

Detroit Pressed Steel Co., Detroit, Mich.
Electric Wheel Co., Quincy, Ill.
Hydraulic Pressed Steel Co., Cleveland, O.
The Parish & Bingham Co., Cleveland, O.
Savage Arms Corp., Sharon, Pa.
Truscon Steel Co., Youngstown, O.

FRICTION CLUTCH PULLEYS

(See Clutches, Power Pulley)

FRICTIONS FOR FRICTION DRIVES

Rockwood Mfg. Co., Indianapolis, Ind.

FUEL FEED SYSTEMS

Sparks-Withington Co., Jackson, Mich.
Stewart-Warner Speedometer Corp., 1828 Diversey Parkway, Chicago.

FUEL INDICATORS

Rochester Mfg. Co., Rochester, N. Y.

FUEL TANKS

(See Tanks).

FURNACES (HEAT-TREATING)

Chicago Flexible Shaft Co., 5600 W. 12th St., Chicago.

FURROW WHEELS (PRESSED STEEL)

Allegheny Steel Co., Brackenridge, Pa.
Galesburg Coulter Disc Co., Galesburg, Ill.

GASKETS

Advance Packing & Supply Co., Chicago.
General Asbestos & Rubber Co., Charleston, S. C.
McCord Mfg. Co., Detroit, Mich.
Thermoid Rubber Co., Trenton, N. J.
Victor Mfg. & Gasket Co., 1956 S. Troy St., Chicago.
Wilmington Fibre Specialty Co., Wilmington, Del.

GASKETS (ASBESTOS AND COPPER)

Advance Packing & Supply Co., Chicago.
McCord Mfg. Co., Detroit, Mich.
Thermoid Rubber Co., Trenton, N. J.
Victor Mfg. & Gasket Co., Troy and 21st Sts., Chicago.

GASKETS (FELT)

Advance Felt Specialty & Cutting Co., 320 S. Jefferson St., Chicago.
American Felt Co., Boston, Mass.
Booth Felt Corp., 450 19th St., Brooklyn, N. Y.
E. R. Brawley, 85 Adams St., Brooklyn, N. Y.
Crandall Packing Co., Palmyra, N. Y.
Fibre Finishing Co., Boston, Mass.
Fitzgerald Co., Torrington, Conn.
Victor Mfg. & Gasket Co., 1956 Troy St., Chicago.

GEARS

Acme Gear Co., Philadelphia, Pa.
Albaugh-Dover Co., 2100 Marshall Blvd., Chicago.
American Manganese Steel Co., McCormick Bldg., Chicago.
Anderson Rolled Gear Co., Cleveland, O.
Brown-Lipe-Chapin Co., Syracuse, N. Y.
Buffalo Gear Works, 623 W. Washington Blvd., Chicago.
The F. H. Bultman Co., Cleveland, O.
Champion Milk Cooler Co., Cortland, N. Y.
Detroit Gear & Machine Co., Detroit, Mich.
Foote Bros. Gear & Mach. Co., 213 N. Curtis St., Chicago.
Frost Gear & Forge Co., Jackson, Mich.
William Ganschow Co., Washington Blvd. and Morgan St., Chicago.
Indianapolis Tool & Mfg. Co., Indianapolis, Ind.
W. A. Jones Foundry & Mach. Co., 1401 W. North Ave., Chicago.
Lavine Gear Co., Milwaukee, Wis.
New Process Gear Corp., Syracuse, N. Y.
R. D. Nuttall Co., Pittsburgh, Pa., and Conway Bldg., Chicago.
Paragon Gear Works, Evans Stamping & Plating Co., Taunton, Mass.
Philadelphia Gear Co., Philadelphia, Pa.
Sivyer Steel Casting Co., Milwaukee, Wis.
Spacke Machine & Tool Co., Indianapolis, Ind.
Turley Gear & Machine Co., St. Louis, Mo.
The Van Dorn & Dutton Co., Cleveland, O.
Wohlrab Gear Co., Racine, Wis.

GEAR BLANKS

Carnegie Steel Co., Pittsburgh, Pa.
Standard Parts Co., Cleveland, O.

GEARS (STEERING)

(See Steering Gears).

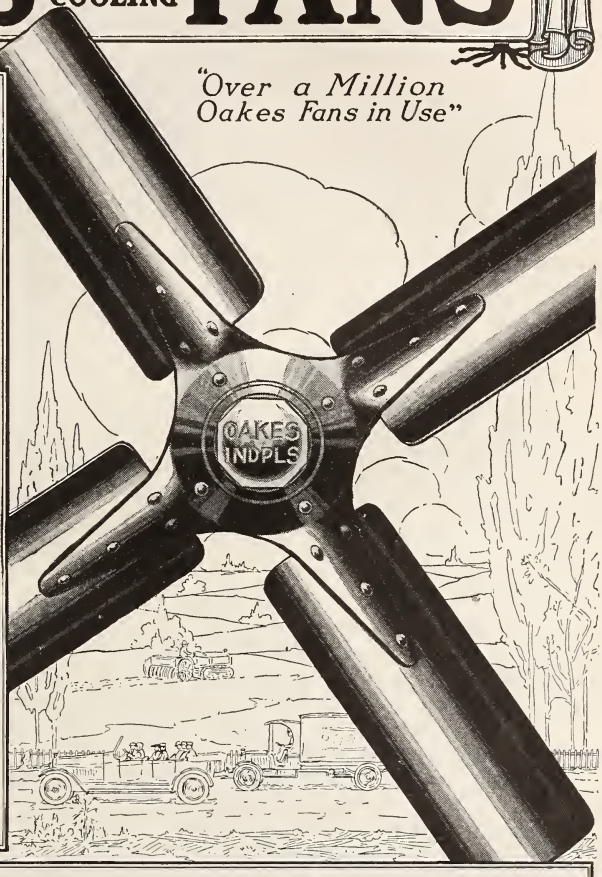
OAKES EFFICIENT COOLING FANS

Now Used by 75 Tractor Makers

THE fact that 75 successful tractor makers today use them as regular equipment is a striking tribute to the superiority and performance of Oakes Fans.

Oakes success here, as in the motor truck and automobile field, is the result of intensive study and co-operative effort with the manufacturers to solve cooling problems.

The farm tractor needs a cooling system of more than average efficiency. It travels at low speed, pulls a heavy load, and consequently the engine develops great heat. The cooling system alone and unaided must check the tremendous heat, if the tractor is to work steadily and give no trouble.



Is Your Fan Doing All a Fan Should Do?

Is your fan doing all that a fan should do? Let us show you what it is possible for an Oakes Fan to do when employed as a unit in your cooling system.

Each type of Oakes Fan for tractors is specially designed and built to meet the cooling needs of the particular tractor on which it is to be installed.

More than one million Oakes Fans are in use today, as standard equipment on America's foremost tractors, trucks, automobiles and motors—243 makes in all. List sent on request.

Back of every Oakes Fan stands the largest factory in the world devoted exclusively to building automotive fans.

Our organization — over 350 persons, working in a modern factory having 70,000 sq. ft. of floor space—is at your service. Send us blueprints and full details on dimensions, fan rotation, etc., so we can suggest best fan construction and installation.

THE OAKES COMPANY Indianapolis, U. S. A.

GENERATORS

Dyneto Electric Corp., Syracuse, N. Y.
North East Electric Co., Rochester, N. Y.
Simms Magneto Co., East Orange, N. J.
Vesta Accumulator Co., 2103 Indiana Ave., Chicago.
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

GONG WHEELS

Allegheny Steel Co., Brackenridge, Pa.

GOVERNORS

Duplex Engine-Governor Co., 36 Flatbush Ave., Brooklyn, N. Y., and 28 E. Jackson Blvd., Chicago.
Kramer Governor Co., Detroit, Mich.
Monarch Governor Co., Detroit, Mich.
Pharo Mfg. Co., Detroit, Mich.
Pickering Governor Co., Portland, Conn.
Pierce Governor Co., Anderson, Ind.
Remy Electric Co., 2715 S. Michigan Ave., Chicago.
Standard Governor Co., 953 N. Church St., Rockford, Ill.
L. J. Watson, Port Huron, Mich.

GRAIN DRILLS (SPECIAL FOR TRACTORS)

American Seeding-Machine Co., Springfield, O.
La Crosse Plow Co., La Crosse, Wis.
Peoria Drill & Seeder Co., Peoria, Ill.

GREASE

(See Lubricants).

GREASE CUPS

Bowen Products Corp., Auburn, N. Y.
The Burns & Bassick Co., Bridgeport, Conn.
Gitz Bros. Mfg. Co., 555 W. Monroe St., Chicago.
Hamilton & DeLoss, Bridgeport, Conn.
Hunter Pressed Steel Co., Philadelphia, Pa.
Lindholm Metal Stamping Co., Camden, N. J.
Merchant & Evans Co., Philadelphia, Pa.
Neora Mfg. Co., Waterbury, Conn.

GRINDING WHEELS

Norton Co., Worcester, Mass.
Waltham Grinding Wheel Co., Waltham, Mass.

GUIDES FOR TRACTORS

Willis-Flack Mfg. Co., Kansas City, Mo.

GUIDE WHEELS (PRESSED STEEL)

Galesburg Coulter Disc Co., Galesburg, Ill.

HACK SAW GAUGE BLOCK

Armstrong Mfg. Co., Bridgeport, Conn.

HARDENING COMPOUNDS

Myall-Wallace Co., 17 E. Austin Ave., Chicago.

HARDENING STEEL PARTS

Myall-Wallace Co., 17 E. Austin Ave., Chicago.
Steel Improvement & Forge Co., Cleveland, O.

HEADLIGHTS

T. J. Corcoran Lamp Co., Cincinnati, O.
Gray & Davis, Inc., Cambridge, Mass.
Tractor Equipment Co., Detroit, Mich.

HEAT TREATING

Chicago Flexible Shaft Co., 5600 W. 12th St., Chicago.
Myall-Wallace Co., 17 E. Austin Ave., Chicago.

HINGED PIPE VISES

Armstrong Mfg. Co., Bridgeport, Conn.

HITCHES

Caswell Mfg. Co., Cherokee, Ia.
Hansmann Mfg. Co., Long Prairie, Minn.
International Harvester Co., Chicago, Ill.
Meadows Mfg. Co., Pontiac, Ill..
Peoria Drill & Seeder Co., Peoria, Ill.

HITCH CLEVIS

Erwin Greer Automobile Co., 1515 Wabash Ave., Chicago.

HOOD FASTENERS

The Burns & Bassick Co., Bridgeport, Conn.
Monarch Carriage Goods Co., Cincinnati, O.

HOODS

Ajax Auto & Aero Sheet Metal Co., New York, N. Y.
Bush Mfg. Co., Hartford, Conn.
Clayton & Lambert Co., Detroit, Mich.
Motors Metal Mfg. Co., Detroit, Mich .
Shotwell-Johnson Co., Minneapolis, Minn.
Truscon Steel Co., Youngstown, O.
York Corrugating Co., York, Pa.

HORNS

Sparks-Withington Co., Jackson, Mich.

HOUSINGS (STEEL)

Gier Pressed Steel Co., Lansing, Mich.
Michigan Steel Castings Co., Detroit, Mich.
Youngstown Pressed Steel Co., Youngstown, O.

HUB CAPS

Standard Parts Co., Cleveland, O.
The Burns & Bassick Co., Bridgeport, Conn.

IGNITION (CABLE)

American Bosch Magneto Corp., Springfield, Mass.
Packard Electric Co., Warren, O.
Rex Ignition Co., New York, N. Y.
Sumter Division, Splitdorf Electrical Co., 1466 Michigan Ave., Chicago.

IGNITION SYSTEMS

Atwater Kent Mfg. Works, Philadelphia, Pa.
Dayton Engineering Laboratories Co., Dayton, O.
Dyneto Electric Corp., Syracuse, N. Y.
The Electric Storage Battery Co., Philadelphia, Pa.
Gray & Davis, Inc., Boston, Mass.
National Coil Co., Lansing, Mich.
North East Electric Co., Rochester, N. Y.
Philips-Brinton Co., Kennett Square, Pa.
Remy Electric Co., 2715 S. Michigan Ave., Chicago.
Splitdorf Electrical Co., Newark, N. J.
Titan Engineering Co., Union City, Ind.
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

IMPULSE STARTERS

American Bosch Magneto Corp., Springfield, Mass.
Eisemann Magneto Co., 32 33rd St., Brooklyn, N. Y.
Kokomo Electric Co., Kokomo, Ind.
The K-W Ignition Co., Cleveland, O.
Simms Magneto Co., East Orange, N. J.
Splitdorf Electrical Co., Newark, N. J.
Standard Ignition Co., Elkhart, Ind.
Sumter Division, Splitdorf Electrical Co., 1466 S. Michigan Ave., Chicago.

INDUSTRIAL WHEELS

(See Wheels, Industrial).

IRON (ARMCO)

American Rolling Mill Co., Middletown, O.

JACKS

Elite Mfg. Co., Ashland, O.
Scully Steel & Iron Co., 2364 S. Ashland Ave., Chicago.

KEROSENE VAPORIZERS

(See Carburetors).

KEYS (FINISHED MACHINES)

Moltrup Steel Products Co., Beaver Falls, Pa.

LACINGS (STEEL)

Flexible Steel Lacing Co., 522 S. Clinton St., Chicago.

LAGS (MANGANESE STEEL)

American Manganese Steel Co., McCormick Bldg., Chicago.

LAMP GUARDS

Flexible Steel Lacing Co., 522 S. Clinton St., Chicago.

LAMP GUARDS (ELECTRIC)

Flexible Steel Lacing Co., 522 S. Clinton St., Chicago.

LAMP GUARDS (PORTABLE—STEEL)

Flexible Steel Lacing Co., 522 S. Clinton St., Chicago.

LAMPS (TRACTOR)

T. J. Corcoran Lamp Co., Cincinnati, O.
Gray & Davis, Cambridge, Mass.
Guide Motor Lamp Co., Cleveland, O.
C. M. Hall Lamp Co., Kenosha, Wis.
Hawthorne Mfg. Co., Bridgeport, Conn.
K-D Lamp Co., Cincinnati, O.
Tractor Equipment Co., 217 Pacific Ave., Detroit, Mich.
Vesta Accumulator Co., 2100 Indiana Ave., Chicago.
Warner Lamp Co., Davenport, Ia.

LEVER LATCHES

The Sykes Metal Lath & Roofing Co., Niles, O.

LIGHTING SYSTEMS

(See Starting and Lighting Systems)

LINKS

American Manganese Steel Co., McCormick Bldg., Chicago.

LINKS (DRAG)

Cincinnati Ball Crank Co., Cincinnati, O.
Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

LOCK WASHERS

(See Washers, Lock).

LUBRICANTS

Acheson Graphite Co., Niagara Falls, N. Y.
Acheson Oildag Co., Port Huron, Mich.
Balso Oil Co., Toledo, O.
Chainolene Mfg. Co., 617 Fulton St., Chicago.
Crew Levick Co., 111 Broad St., Philadelphia, Pa.
Detroit Soluble Oil Co., Detroit, Mich.
Joseph Dixon Crucible Co., Jersey City, N. J.
Economy Oil Co., 542 W. 13th St., Chicago.
Fiske Bros. Refining Co., New York, N. Y.
Friction Proof Lubricant Co., 2nd and Market Sts., Des Moines, Ia.
General Refining Co., Cleveland, O.
Great Northern Refining Co., Lytton Bldg., Chicago.
Gulf Refining Co., Frick Bldg. Annex, Pittsburgh, Pa.
Hawkeye Oil Co., Waterloo, Ia.
Indian Refining Co., 44 Whitehall St., New York, N. Y.
Invader Oil Co., New York, N. Y.
Keystone Lubricating Co., 3rd and Spruce Sts., St. Louis, Mo.
Marshall Oil Co., Marshalltown, Ia.
Monarch Mfg. Co., Toledo, O., also Council Bluffs, Ia.
Mutual Oil Co., Kansas City, Mo.
National Refining Co., Cleveland, O.
The New Chicago Co., 2525 Clybourn Ave., Chicago.
Northwestern Chemical Co., Marietta, O.
Phinny Bros. Co., Oil City, Pa.
Pittsburgh Oil Refining Co., 714 Bessemer Bldg., Pittsburgh, Pa.
Platt & Washburn Refining Co., New York, N. Y.
Standard Oil Co., 72 W. Adams St., Chicago.
Swan & Finch, 165 Broadway, New York, N. Y.
The Texas Oil Co., 17 Battery Place, New York, N. Y.
Tide Water Oil Co., 11 Broadway, New York, N. Y.
Vacuum Oil Co., 61 Broadway, New York, N. Y.
Viscosity Oil Co., 1101 W. 37th St., Chicago.
White Star Refining Co., Detroit, Mich.

LUBRICATORS

Detroit Lubricator Co., Detroit, Mich.
Gitz Bros. Mfg. Co., 19th and Kilbourne Sts., Chicago.
Madison-Kipp Corp., Madison, Wis.
(See advertisement page 193)
Manzel Bros. Co., Buffalo, N. Y.
Traction Lubricating Co., 69 W. Washington St., Chicago.

LUGS (TRACTOR WHEEL)

Universal Lug Co., Cicero, Ill.

MACHINE TOOLS

Automatic Machine Co., Dayton, O.
Greenfield Tap & Die Corp., Greenfield, Mass.
Monmouth Machine Co., Cleveland, O.
Turner Machine Co., Danbury, Conn.

MACHINE WORK

(Special to Blue Print)

Otto Konigslow Mfg. Co., Cleveland, O.

MAGNETOS

American Bosch Magneto Corp., Springfield, Mass.
Angola Electric Mfg. Co., Angola, Ind.
Eisemann Magneto Co., 32 33rd St., Brooklyn, N. Y.
(See advertisement, page 191)
Ericsson Mfg. Co., Buffalo, N. Y.
Heinze Electric Co., Lowell, Mass.
Henricks Magneto & Electric Co., Indianapolis, Ind.
Hercules Electric Co., Indianapolis, Ind.
Kokomo Electric Co., Kokomo, Ind.
The K-W Ignition Co., Cleveland, O.
Pellet Magneto Co., 25th St. and Wabash Ave., Chicago.
Quick Action Ignition Co., South Bend, Ind.
Remy Electric Co., 2715 S. Michigan Ave., Chicago.
Simms Magneto Co., East Gronge, N. J.
Splitdorf Electrical Co., Newark, N. J.
Standard Ignition Co., Elkhart, Ind.
Sumter Division, Splitdorf Electrical Co., 1466 S. Michigan Ave., Chicago.
The Teagle Co., Cleveland, O.
Webster Electric Co., Racine, Wis.
Witherbee Igniter Co., Springfield, Mass.

MAGNETO COUPLINGS

Geo. D. Bailey Co., 1120 S. Michigan Ave., Chicago.
Thermoid Rubber Co., Trenton, N. J.

MANGANESE STEEL PRODUCTS

American Manganese Steel Co., McCormick Bldg., Chicago.
Taylor-Wharton Iron & Steel Co., Highbridge, N. J.

MANIFOLDS

Imperial Brass Mfg. Co., 521 S. Michigan Ave., Chicago.
Marshall Castings Co., South Haven, Mich.
Sunderman Corp., Newburgh, N. Y.
Western Carburetor Co., Alma, Mich.

MERCHANT BARS

Carnegie Steel Co., Pittsburgh, Pa.

METAL SPECIALTIES

Cornwall Mfg. Co., Cleveland, O.
Merchant & Evans Co., Philadelphia, Pa.

METAL WASHERS

Kales Stamping Co., Detroit, Mich.
Otto Konigslow Mfg. Co., Cleveland, O.

METALS

Merchant & Evans, 2035 Washington Ave., Philadelphia, Pa.

MOTION PICTURE PROJECTORS (PORTABLE)

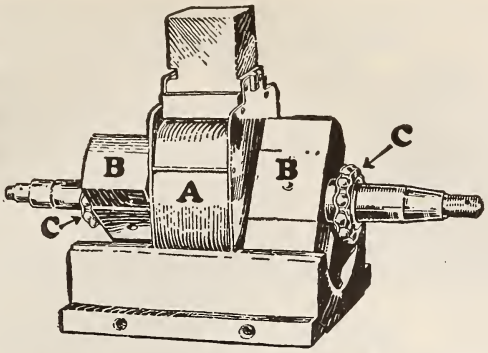
Atlas Educational Film Co., 63 E. Adams St., Chicago.
Commercial Motion Picture Mfg. Co., 2436 Sheffield Ave., Chicago.
The De Vry Corp., 117 N. Wells St., Chicago.

MOTOMETERS

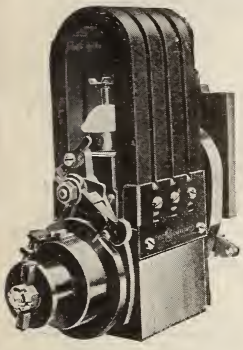
Metalware Corp., 143 Austin Ave., Chicago.
The Motometer Co., Inc., Long Island City, N. Y.

MOTORS

American Sleeve Valve Motor Co., Widener Bldg., Philadelphia, Pa.
Anderson Engine Co., 4036 N. Rockwell St., Chicago.
Automatic Machine Co., Bridgeport, Conn.
Beaver Mfg. Co., Milwaukee, Wis.



As Simple as a Water Wheel



KW Model HK High Tension Magneto with Impulse Starter.

The simplest form of power generation is the water wheel which consists of a series of paddles mounted on a shaft, running in simple bearings and requiring only an occasional oiling.

Like the water wheel, the K-W Magneto owes its reliability to this same simple construction. The windings (A) are stationary, while the paddle-like rotor (BB) revolves in ball bearings (CC) and generates the current. Like the water wheel, the internal parts of K-W Magnetos need absolutely no attention except for an occasional oiling.

There are no moving wires, revolving windings, troublesome commutators and brushes, current collector rings, etc., in this patented K-W construction. We thereby eliminate all internal sparking and trouble due to sliding contacts and poor connections. In K-W construction all internal connections are permanent.

Don't put up with inefficient, troublesome ignition. Insist upon

TRADE K-W MARK High Tension MAGNETOS

which require no more attention than a water wheel—magnetos that are as efficient as they are reliable. There is a type for every tractor.

Forty of America's leading tractor manufacturers use K-W Magnetos as standard equipment on 83 models. These manufacturers know that K-W "Inductor" design gives the tractor user the utmost in reliability and efficiency. These manufacturers know the unvarying quality of K-W and the service built into K-W Magnetos.

See that the tractor you sell is K-W equipped. K-W equipped tractors sell easier because tractor buyers everywhere know that a K-W Magneto needs no more attention than a water wheel.

Write for a list of K-W equipped tractors.

THE TRADE K-W MARK IGNITION Co.

2839 Chester Ave. CLEVELAND, OHIO, U.S.A.

Brennen Motor Mfg. Co., Syracuse, N. Y.
Bonner-Charter Motor Co., McCormick Bldg., Chicago.
Buda Co., Harvey, Ill.
Buffalo Gasoline Motor Co., Buffalo, N. Y.
Chandler & Taylor Co., Indianapolis, Ind.
Chief Motor Co., Port Huron, Mich.
Climax Engineering Co., Clinton, Ia.
Continental Motors Corp., Detroit, Mich.
H. C. Doman Co., Oshkosh, Wis.
Duesenberg Motors Corp., New York, N. Y.
Enterprise Machinery Co., Minneapolis, Minn.
Erd Motor Co., Saginaw, Mich.
Falls Machine Co., Sheboygan Falls, Wis.
Field Motor Co., Grand Rapids, Mich.
Gile Tractor & Engine Co., Ludington, Mich.
Golden, Belknap & Swartz Co., Detroit, Mich.
Gray Motor Co., Detroit, Mich.
Hercules Motor Mfg. Co., Canton, O.
Hinkley Motors Corp., Detroit. Mich.
Kermath Mfg. Co., Detroit, Mich.
The LeRoi Co., Milwaukee, Wis.
Light Mfg. & Fdry. Co., Pottstown, Pa.
Lockwood-Ash Motor Co., Jackson, Mich.
Lycoming Foundry & Machine Co., Williamsport, Pa.
Matthews Engineering Co., Sandusky, O.
The Minerva Engine Co., Cleveland, O.
Minneapolis Steel & Mchy. Co., Minneapolis, Minn.
Monarch Machine Works, Milwaukee, Wis.
Niagara Motors Corp., Buffalo, N. Y.
North American Motors Corp., Pottstown, Pa.
Red Wing Motor Co., Red Wing, Minn.
Reliable Engine Co., Portsmouth, O.
Roberts Motor Co., Sandusky, O.
Rutenber Motor Co., Marion, Ind.
Scripps-Booth Corp., Sterling Division, Detroit, Mich.
Standard Motor Construction Co., Jersey City, N. J.
Supreme Motors Corp., Ashtabula, O.
Toro Motor Co., Minneapolis, Minn.
Van Blerck Motor Co., 50 E. 42d St., New York.
Veerac Co., Minneapolis, Minn.
H. J. Walker Co., Cleveland, O.
Waukesha Motor Co., Waukesha, Wis.
Weidely Motors Co., Indianapolis, Ind.
Wilcox Motor & Mfg. Co., Saginaw, Mich.
Wisconsin Motor Mfg. Co., Milwaukee, Wis.

MUFFLERS

International Steel Products Co., Hartford, Wis.
Vacuum Muffler Corp. of America, New York, N. Y.

NUT FASTENERS

American Nut & Bolt Fastener Co., Pittsburgh, Pa.

OIL

(See Lubricants)

OILERS

The Burns & Bassick Co., Bridgeport, Conn.
Cannon Oiler Co., Keithsburg, Ill.
Eagle Glass & Mfg. Co., Wellsburg, W. Va.

PAINT AND VARNISH (SPECIAL FOR TRACTORS

Devoe & Raynolds Co., 14 W.Lake St., Chicago.
Glidden Co., Cleveland, O.
National Lead Co., 111 Broadway, New York.
Tousey Varnish Co., 520 W. 25th St., Chicago.
Tractor Equipment Co., Detroit, Mich.

PATTERN PLATES (FOUNDRY)

Moltrup Steel Products Co., Beaver Falls, Pa.

PEDAL SHAFTS

Steel Products Co., Clarkwood Rd., Cleveland, O.

PINS

American Manganese Steel Co., McCormick Bldg., Chicago.
Butler Mfg. Co., Indianapolis, Ind.

PIPE CUTTERS

Armstrong Mfg. Co., Bridgeport, Conn.

PIPE DIES

Armstrong Mfg. Co., Bridgeport, Conn.

PIPE MACHINES

Armstrong Mfg. Co., Bridgeport, Conn.

PIPE WRENCHES

Armstrong Mfg. Co., Bridgeport, Conn.

PISTON PINS

Butler Mfg. Co., Indianapolis, Ind.
Spacke Machine & Tool Co., Indianapolis, Ind.
Steel Products Co., Clarkwood Rd., Cleveland, O.
Wainwright Engineering Corp., Connersville, Ind.

PISTON RINGS

Albertson & Co., Sioux City, Ia.
American Hammered Piston Ring Co., Newark, N. J.
Baker Valve Co., Minneapolis, Minn.
Burd High Compression Ring Co., Rockford, Ill.
Butler Mfg. Co., Indianapolis, Ind.
Canton Auto Parts Mfg. Co., Canton, O.
Double Seal Ring Co., Kansas City, Mo.
Du Bois Piston Ring Co., Auburn, N. Y.
Evertight Piston Ring Co., St. Louis, Mo.
Gill Mfg. Co., 351 W. 59th St., Chicago, Ill.
Inland Machine Works, St. Louis, Mo.
Iron City Products Co., Pittsburgh, Pa.
Keys Piston Ring Co., St. Louis, Mo.
V. A. Longaker Co., Indianapolis, Ind.
Metal Products Co., St. Louis, Mo.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Modern Electric & Machine Co., Indianapolis, Ind.
Modern Motor Parts Co., Rockford, Ill.
Pennsylvania Piston Ring Co., Cleveland, O.
Piston Ring Co., Muskegon, Mich.
Pressure Proof Piston Ring Co., Boston, Mass.
The Seal-Tite Piston Ring Co., Minneapolis, Minn.
Splitdorf Electrical Co., Newark, N. J.
Trump Mfg. Co., Crown Point, Ind.
Wainwright Engineering Corp., Connersville, Ind.
Wasson Piston Ring Co., Plainfield, N. J.

PISTONS

Butler Mfg. Co., Indianapolis, Ind.
Dall Motor Parts Co., Vermillion, O.
Green Engineering Co., Dayton, O.
V. A. Longaker Co., Indianapolis, Ind.
Modern Electric & Machine Co., Indianapolis, Ind.
Wainwright Engineering Corp., Connersville, Ind.

PLANTER TIRE

Carnegie Steel Co., Pittsburgh, Pa.

PLATES

Carnegie Steel Co., Pittsburgh, Pa.

PLATES (STEEL)

Moltrup Steel Products Co., Beaver Falls, Pa.

PLOW BEAMS

Carnegie Steel Co., Pittsburgh, Pa.

PRESSED STEEL PARTS

Allegheny Steel Co., Brackenridge, Pa.
The Bryan Plow Co., Bryan, O.
Detroit Pressed Steel Co., Detroit, Mich.
Galesburg Coulter Disc Co., Galesburg, Ill.
National Pressed Steel Co., Massillon, O.
Perro Machine & Foundry Co., Cleveland, O.
Worcester Pressed Steel Co., Worcester, Mass.

PULLERS (GEAR AND WHEEL)

Crane Puller Co., Arlington, Mass.
Greb Co., 180 State St., Boston, Mass.
Motor Specialties Co., Waltham, Mass.

PULLERS (TRACTOR)

(See Tractor Pullers)

PULLEYS

Pyott Foundry Co., 328 N. Sangamon St., Chicago.
Rockwood Mfg. Co., Indianapolis, Ind.

PUMPS

Crum-Wiley Co., Peru, Ind.
Fulflo Pump Co., Cincinnati, O.
Imperial Brass Mfg. Co., 519 S. Racine Ave., Chicago.
Lobee Pump & Machinery Co., Buffalo, N. Y.
M. L. Oberdorfer Brass Co., Syracuse, N. Y.

PUSH RODS

Steel Products Co., Clarkwood Rd., Cleveland, O.

QUADRANTS

Otto Konigslow Mfg. Co., Cleveland, O.

RADIATOR BRACES

Otto Konigslow Mfg. Co., Cleveland, O.

RADIATOR HOSE

Hide, Leather & Belting Co., Indianapolis, Ind.
The Mechanical Rubber Co., 308 W. Randolph St., Chicago.

RADIATOR LIQUID

Buffalo Specialty Co., Buffalo, N. Y.
"X" Laboratories, Boston, Mass.

RADIATORS

Ajax Auto & Aero Sheet Metal Co., New York, N. Y.
Auto Radiator Mfg. Co., 762 W. Van Buren St., Chicago
B. & W. Mfg. Co., 5235 Ravenswood Ave., Chicago.
Bremer Mfg. Co., 846 S. Canal St., Chicago.
Bush Mfg. Co., Hartford, Conn.
Candler Radiator Co., Detroit, Mich.
C. A. S. Engineering Co., Detroit, Mich.
Eureka Auto Parts Mfg. Co., St. Louis, Mo.
The Fedders Mfg. Co., Buffalo, N. Y.
G. & O. Mfg. Co., New Haven, Conn.
Harrison Radiator Corp., Lockport, N. Y.
Hooven Radiator Co., 517 W. Monroe St., Chicago.
Ideal Sheet Metal Works, 213 N. Morgan St., Chicago.
Jamestown Car Parts Mfg. Co., Jamestown, N. Y.
Long Mfg. Co., Detroit, Mich.
McCord Mfg. Co., Detroit, Mich.
Mayo Radiator Division of Marlin-Rockwell Corp., New Haven, Conn.
Modine Mfg. Co., Racine, Wis.
National Can Co., Radiator Dept., Detroit, Mich.
Perfex Radiator Co., Racine, Wis.
Rome-Turney Radiator Co., Rome, N. Y.
Shotwell-Johnson Co., Minneapolis, Minn.
Sparks-Withington Co., Jackson, Mich.
Standard Radiator Co., Springville, N. Y.
Todd Mfg. Co., Minneapolis, Minn.
United States Cartridge Co., New York, N. Y.
Warner Gear Co., Muncie, Ind.
Wright Cooler & Hood Mfg. Co., 4868 N. Clark St., Chicago.

RESILIOMETER (WIDNEY PATENT)

Advance Felt Specialty & Cutting Co., 320 S. Jefferson St., Chicago.

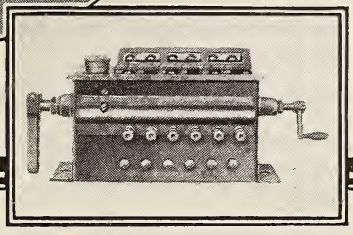
RETAINERS (BALL AND DUST)

Otto Konigslow Mfg. Co., Cleveland, O.

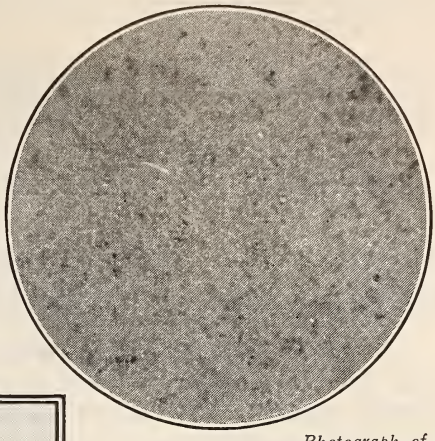
ROD ASSEMBLIES

Steel Products Co., Michigan Plant., Hart Ave., Detroit Mich.

Photograph of a drop of fresh oil viewed through a microscope. Note its freedom from dirt and grit.



Six feed Madison-Kipp fresh-oil Lubricator



Photograph of a drop of used oil as seen through the microscope. Note the dirt and grit.

Fresh Oil vs. Used Oil in Tractors

There is a good deal of confusion right now in the names used to describe tractor lubricating systems.

There are only two kinds of lubricating systems: those using oil over again and those which use fresh oil only.

The first kind is described by many names—such as circulating, force-pump, splash, crankcase system and the like—but they all mean that the oil is used over and over.

The fresh-oil kind is generally described in specifications by naming the lubricator used, and the great majority of tractors now built specify Madison-Kipp Lubricators.

Why Fresh Oil Is Better

The experienced tractor manufacturers use Madison-Kipp Lubricators because their fresh oil keeps down repair costs and betters the working of the motor.

This holds for both two and four cylinder motors using kerosene or low grade gasoline.

Fresh oil is the only kind of oil that really lubricates—and that really protects the working parts and bearings from undue wear.

Used oil, on the contrary, is so full of grit and sediment that it grinds down the parts it is supposed to protect.

What the Microscope Tells

The photographs at the top of this page show the difference between fresh oil and the used oil from a tractor's crank case.

These photographs are taken through a microscope. Note how smooth and clear the fresh oil is.

Note the sharp sediment and grit in the used oil.

Your motor doesn't need a microscope to detect this grinding grit any more than a gear box needs help in detecting a handful of sand thrown into it.

Protect Yourself

Before you buy a tractor study the lubrication specifications.

Remember that there are only two kinds of systems, although many names are used to describe the less scientific kind.

Note that generally the manufacturers who have made good tractors for a term of years use Madison-Kipp Lubricators although these cost them more than other systems.

And that Kipp-Equipt tractors cost you no more and are worth much more.

The Madison-Kipp Corp
Madison, Wisconsin

Madison-Kipp Lubricators

FRESH OIL SYSTEMS

RODS (CONNECTING)
Cleveland City Forge & Iron Co., Cleveland, O.
Steel Products Co., Clarkwood Rd., Cleveland, O.

RODS (RADIUS)
Cleveland City Forge & Iron Co., Cleveland, O.

ROLLER BEARINGS
(See Bearings, Roller).

ROLLERS
American Manganese Steel Co., McCormick Bldg., Chicago.

SEARCHLIGHTS
Gray & Davis, Inc., Boston, Mass.
Hawthorne Mfg. Co., Bridgeport, Conn.
Stewart-Warner Speedometer Corp., 1828 Diversey Parkway, Chicago.

SCREWS
American Screw Co., Providence, R. I.
Chicago Screw Co., 1046 S. Homan Ave., Chicago.
National Lock Co., Rockford, Ill.
Victor Screw Works, Detroit, Mich.

SCREW MACHINE PRODUCTS
Automatic Machine Co., Dayton, O.
Erie Specialty Co., Erie, Pa.
Federal Nut, Bolt & Machine Co., Cleveland, O.
Ford-Clark Co., Cleveland, O.
Hartford Machine Screw Co., Hartford, Conn.

SEAT CUSHIONS
American Cushion Spring Co., Kalamazoo, Mich.
U. S. Pressed Steel Co., Ypsilanti, Mich.

SEATS (PRESSED STEEL)
The Sykes Metal Lath & Roofing Co., Niles, O.
U. S. Pressed Steel Co., Ypsilanti, Mich.
Youngstown Pressed Steel Co., Youngstown, O.

SECTORS
Otto Konigslow Mfg. Co., Cleveland, O.

SELF-STARTER FOR TRACTORS
Christensen Engineering Co., Milwaukee, Wis.

SHAFTING AND SCREW STOCK (COLD DRAWN STEEL)
Moltrup Steel Products Co., Beaver Falls, Pa.

SHAFTS (BRAKE)
Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

SHAFTS (EQUALIZER)
Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

SHAFTS (FAN)
Steel Products Co., Clarkwood Rd., Cleveland, O.

SHAFTS (MAGNETO)
Steel Products Co., Clarkwood Rd., Cleveland, O.

SHAFTS (PUMP)
Steel Products Co., Clarkwood Rd., Cleveland, O.

SHIMS
The Burns & Bassick Co., Bridgeport, Conn.
Kickhaefer Mfg. Co., Milwaukee, Wis.
Otto Konigslow Mfg. Co., Cleveland, O.
Laminated Shim Co., 633 Canal St., New York.

SHOES (MANGANESE STEEL)
American Manganese Steel Co., McCormick Bldg., Chicago.

SPARK COILS
Jefferson Electric Co., 430 S. Green St., Chicago.

SPARK PLUGS
Air Friction Carburetor Co., Dayton, O.
Auburn Ignition Mfg. Co., Auburn, N. Y.
L. F. Benton Co., Vergennes, Vt.
Bergie National Spark Plug Co., Rockford, Ill.
Edward A. Cassidy Co., New York, N. Y.
Champion Ignition Co., Flint, Mich.
Champion Spark Plug Co., Toledo, O.
Cumming-Forster Corp., 220 S. State St., Chicago.
Eclipse Mfg. Co., Indianapolis, Ind.
La French Power Spark Plug Co., Columbus, O.
Emil Grossman Mfg. Co., Brooklyn, N. Y.
Hampshire Mfg. Co., Hatfield, Mass.
Hartford Machine Screw Co., Hartford, Conn.

Herz & Co., 245 W. 55th St., New York.
Janesville Products Co., Janesville, Wis.
H. W. Johns-Manville Co., Madison Ave. and 41st St., New York.
Lockwood-Ash Motor Co., Jackson, Mich.
V. A. Longaker, Indianapolis, Ind.
Long Bros., Kokomo, Ind.
Morgan Mfg. Co., Keene, N. H.
A. R. Mosler & Co., Mt. Vernon, N. Y.
Oakes & Dow Co., Boston, Mass.
Rajah Auto Supply Co., Bloomfield, N. J.
Reflex Ignition Co., Cleveland, O.
Sharp Spark Plug Co., Cleveland, O.
Siebert Mfg. Co., Dayton, O.
Silvex Co., South Bethlehem, Pa.
Splitdorf Electrical Co., Newark, N. J.
Stewart-Warner Speedometer Corp., 1828 Diversey Parkway, Chicago.
Sumter Division, Splitdorf Electrical Co., 1466 Michigan Ave., Chicago.
Tungsten Mfg. Co., Marshalltown, Ia.
Twin Fire Spark Plug Co., Detroit, Mich.
United Mfg. & Distributing Co., Lake Shore Drive and Ohio St., Chicago.
The Vital Mfg. Co., Cleveland, O.
Western Spark Plug Co., Kansas City, Mo.

SPEED INDICATORS FOR TRACTORS

W. G. Nagel Electric Co., Toledo, O.
Waltham Watch Co., Waltham, Mass.

SPRINGS (COIL)

Cleveland Wire Spring Co., Cleveland, O.
Cuyahoga Spring Co., Cleveland, O.
General Spring & Wire Co., Detroit, Mich.
M. D. Hubbard Spring Co., Pontiac, Mich.

SPRINGS (LEAF)

Higgins Spring & Axle Co., Racine, Wis.
M. D. Hubbard Spring Co., Pontiac, Mich.

SPRING LINKS

Otto Konigslow Mfg. Co., Cleveland, O.

SPRING STEEL

Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.
Standard Parts Co., Cleveland, O.

SPROCKETS

American Manganese Steel Co., McCormick Bldg., Chicago.
Chain Belt Co., Milwaukee, Wis.
Cullman Wheel Co., 1346 Altgeld St., Chicago.

STAMPINGS (SHEET METAL)

Acklin Stamping Co., Toledo, O.
Acme Sheet Metal & Mfg. Co., Cleveland, O.
Allegheny Steel Co., Brackenridge, Pa.
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Bettcher Mfg. Co., Cleveland, O.
Bossert Corporation, Utica, N. Y.
Cleveland Wrought Products Co., Cleveland, O.
Cornwall Mfg. Co., Cleveland, O.
Cuyahoga Spring Co., Cleveland, O.
Dail Steel Products Co., Lansing, Mich.
Detroit Pressed Steel Co., Detroit, Mich.
Geuder, Paeschke & Frey Co., Milwaukee, Wis.
Globe Machine & Stamping Co., Cleveland, O.
Hamilton & DeLoss, Bridgeport, Conn.
The Hydraulic Pressed Steel Co., Cleveland, O.
Kales Stamping Co., Detroit, Mich.
Kickhaefer Mfg. Co., Milwaukee, Wis.
Kirk & Blum, Cincinnati, O.
Otto Konigslow Mfg. Co., Cleveland, O.
Lansing Stamping & Tool Co., Lansing, Mich.
McDowell Mfg. Co., Pittsburgh, Pa.
Motors Metal Mfg. Co., Detroit, Mich.
The Oakes Co., Indianapolis, Ind.
Parish & Bingham Co., Cleveland, O.
Shotwell-Johnson Co., Minneapolis, Minn.
Standard Parts Co., Cleveland, O.
Standard Tool & Mfg. Co., Detroit, Mich.
Superior Metal Products Co., Elyria, O.
Worcester Stamped Metal Co., Worcester, Mass.

STARTER COILS

Fansteel Co., North Chicago, Ill.

STARTING CRANKS

Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

STARTING AND LIGHTING SYSTEMS

Atwater Kent Mfg. Works, Philadelphia, Pa.
Dayton Engineering Laboratories Co., Dayton, O.
Dyneto Electric Corp., Syracuse, N. Y.
The Electric Storage Battery Co., Philadelphia, Pa.
Gray & Davis, Inc., Boston, Mass.
National Coil Co., Lansing, Mich.
North East Electric Co., Rochester, N. Y.
Pellet Magneto Co., 25th St. and Wabash Ave., Chicago.
Philips-Brinton Co., Kennett Square, Pa.
Remy Electric Co., 2715 S. Michigan Ave., Chicago.
Titan Engineering Co., Union City, Ind.
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

STEEL HARDENING AND ANNEALING

Myall-Wallace Co., 17 E. Austin Ave., Chicago.
Steel Improvement & Forge Co., Cleveland, O.

STEEL (SPECIAL FOR TRACTOR PARTS)

Allegheny Steel Co., Pittsburgh, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Andrews Steel Co., Newport, Ky.
Atlas Crucible Steel Co., Dunkirk, N. Y.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.
The Central Steel Co., Massillon, O.
Electric Steel Co., W. 31st and S. Wood Sts., Chicago.
Elyria Iron & Steel Co., Cleveland, O.
Gier Pressed Steel Co., Lansing, Mich.
Inland Steel Co., First National Bank Bldg., Chicago.
Interstate Iron & Steel Co., Monroe Bldg., Chicago.
Lancaster Steel Products Co., 2715 S. Michigan Ave., Chicago.
La Salle Steel Co., 2305 S. Halsted St., Chicago.
McCord & Co., Peoples Gas Bldg., Chicago.
Merchant & Evans Co., Philadelphia, Pa.
National Pressed Steel Co., Massillon, O.
Ohio Steel Foundry Co., Springfield, O.
Jos. T. Ryerson & Son, 16th and Rockwell Sts., Chicago.
Stark Rolling Mill Co., Canton, O.
Swedish Crucible Steel Co., Detroit, Mich.
Trumbull Steel Co., Warren, O.
Truscon Steel Co., Youngstown, O.

STEEL STAMPINGS

The Parish & Bingham Co., Cleveland, O.

STEERING ARMS

Cleveland City Forge & Iron Co., Cleveland, O.

STEERING GEARS

Gemmer Mfg. Co., Detroit, Mich.
Jackson-Church-Wilcox Co., Saginaw, Mich.
Lorenz Motor Co., Racine, Wis.
Ross Gear & Tool Co., La Fayette, Ind.
Warner Gear Co., Muncie, Ind.

STOCKS AND DIES (PIPE AND BOLT)

Armstrong Mfg. Co., Bridgeport, Conn.

SWITCHES (ELECTRIC)

Clum Mfg. Co., Milwaukee, Wis.

TANKS

A. B. & B. Specialty Co., Milwaukee, Wis.
F. S. Bowser & Co., Ft. Wayne, Ind.
Champion Milk Cooler Co., Cortland, N. Y.
Clayton & Lambert Mfg. Co., Detroit, Mich.
Cornwall Mfg. Co., Cleveland, O.
Janney Steinmetz & Co., 1421 Chestnut St., Philadelphia, Pa.
L. O. Koven & Bros., Jersey City, N. J.
Motors Metal Mfg. Co., Detroit, Mich.
National Stamping & Electric Works, 410 S. Clinton St., Chicago.
Rochester Mfg. Co., Rochester, N. Y.
Shotwell-Johnson Co., Minneapolis, Minn.
Sparks-Withington Co., Jackson, Mich.
John Trageser Steam Copper Works, New York, N. Y.
York Corrugating Co., York, Pa.

TANK STRAPS

Otto Konigslow Mfg. Co., Cleveland, O.
Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

TEMPERATURE CONTROL DEVICES

The Fulton Co., Knoxville, Tenn.

TESTING INSTRUMENTS

Advance Felt Specialty & Cutting Co., 320 S. Jefferson St., Chicago.

THERMOSTATS

The Fulton Co., Knoxville, Tenn.

TIMER (SPECIAL FOR TRACTORS)

J. & B. Mfg. Co., Pittsfield, Mass.

TIRE FLANGES

Otto Konigslow Mfg. Co., Cleveland, O.

TOOLS

Automatic Machine Co., Dayton, O.
Keystone Mfg. Co., Buffalo, N. Y.
Stow Mfg. Co., Binghamton, N. Y.

TOOL BOXES

Corcoran-Victor Co., Cincinnati, O.
Shotwell-Johnson Co., Minneapolis, Minn.
Standard Steel Box Co., Bridgeville, Pa.
U. S. Pressed Steel Co., Ypsilanti, Mich.

TORQUE RODS

Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

TRACTOR COVERS

(See Covers, Canvas)

TRACTION RIMS

Foley Traction Rim Co., Minneapolis, Minn.

TRACTOR GEAR AND WHEEL PULLERS

Crane Puller Co., Arlington, Mass.
The Greb Co., 180 State St., Boston, Mass.

TRACTOR PULLERS

Crane Puller Co., Arlington, Mass.

TRACTOR TIRE SECTION

Carnegie Steel Co., Pittsburgh, Pa.

TRANSMISSIONS

Borg & Beck Co., Moline, Ill.
Campbell Transmission Co., Buchanan, Mich.
Cotta Transmission Co., Rockford, Ill.
Covert Gear Co., Inc., Detroit, Mich.
Demmler Mfg. Co., Detroit, Mich.
Detroit Gear & Machine Co., Detroit, Mich.
Dorr-Miller Differential Co., 90 West St., New York.

Durston Gear Co., Syracuse, N. Y.
Foote Bros. Gear & Mach. Co., 213 N. Curtis St., Chicago.
Fuller & Sons Mfg. Co., Kalamazoo, Mich.
Wm. Ganschow Co., Washington Blvd. and Morgan St., Chicago.
M. & S. Gear Co., Detroit, Mich.
National Clutch Co., Fulton and Lincoln Sts., Chicago.
R. D. Nuttall Co., Pittsburgh, Pa., and Conway Bldg., Chicago.
Paragon Gear Works, Evans Stamping & Plating Co., Taunton, Mass.
Warner Gear Co., Muncie, Ind.

TUBES

Steel Products Co., Michigan Plant, Hart Ave., Detroit, Mich.

TUBES (PROPELLER)

(See Tubes).

TUBING

American Tube Co., Rockwell and 37th Sts., Chicago.
Dallas Brass & Copper Co., 223 N. Jefferson St., Chicago.
The Elyria Iron & Steel Co., Cleveland, O.
Merchant & Evans Co., Philadelphia, Pa.
Standard Parts Co., Cleveland, O.
United Metal Hose Co., New York, N. Y.
Wolverine Tube Co., Detroit, Mich.

TURNTABLES

Link-Belt Co., 39th St. and Stewart Ave., Chicago.

UNIVERSAL JOINTS

Baker Gun & Forging Co., Batavia, N. Y.
Cleveland City Forge & Iron Co., Cleveland, O.
Hartford Automotive Parts Co., Hartford, Conn.
Hide, Leather & Belting Co., Indianapolis, Ind.
Hoosier Auto Parts Co., Muncie, Ind.
Merchant & Evans Co., Philadelphia, Pa.
Spicer Mfg. Corp., South Plainfield, N. J.
Thermoid Rubber Co., Trenton, N. J.

VALVES

Fansteel Products Co., North Chicago, Ill.
The Ford-Clark Co., Cleveland, O.
Lewis Steel Products Co., Toledo, O.
Lunkenheimer Co., Cincinnati, O.
Michigan Engine Valve Co., Detroit, Mich.
Schlieder Mfg. Co., Detroit, Mich.
Steel Products Co., Clarkwood Rd., Cleveland, O.

VALVE ROTATORS

Continental Engineering Corp., Omaha, Neb.

VALVE TAPPETS

Steel Products Co., Clarkwood Rd., Cleveland, O.

VALVE GRINDERS

Black & Decker Mfg. Co., Baltimore, Md.
Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Patterson Engineering & Mfg. Co., Worcester, Mass.
Stenman Electric Valve Grinder Co., Worcester, Mass.

VICTOR TRACTOR LAMP

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WASHERS (FELT)

Advance Felt Specialty & Cutting Co., 320 S. Jefferson St., Chicago.
Booth Felt Corp., Inc., 450 19th St., Brooklyn, N. Y.
E. R. Brawley, 85 Adams St., Brooklyn, N. Y.
Excelsior Leather Washer Mfg. Co., Rockford, Ill.

WASHERS (LOCK)

The American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Reliance Mfg. Co., Massillon, O.

WELDING EQUIPMENT

Steel Products Co., Metals Welding Plant, Cleveland, O

WELDING (GAS AND ELECTRIC)

Steel Products Co., Metals Welding Plant, Cleveland, O.

WELDING (STEEL)

Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

WHEELS (INDUSTRIAL)

Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.
Grid Iron Grip Co., 203 Safety Bldg., Rock Island, Ill.
Michigan Steel Castings Co., Detroit, Mich.
Standard Steel Castings Co., 616 S. Michigan Ave., Chicago.

WHEELS (SPECIAL TRACTOR)

Frank M. Coe, 802 W. 181st St., New York, N. Y.
Electric Wheel Co., Quincy, Ill.
French & Hecht, Davenport, Ia., Springfield, O.
Havana Metal Wheel Co., Havana, Ill.
Hayes Wheel Co., Jackson, Mich.
Hoosier Wheel Co., Franklin, Ind.
J. R. Little Metal Wheel Co., Quincy, Ill.
Peru Plow & Wheel Co., Peru, Ill.
P-T Wheel Co. of America, Dayton, O.
Standard Steel Castings Co., 616 S. Michigan Ave., Chicago.

WORMS AND WORM GEARS

The Cleveland Worm & Gear Co., Cleveland, O.
Hindley Gear Co., Philadelphia, Pa.
Timken Detroit Axle Co., Detroit, Mich.

WORM SHAFTS

Cleveland City Forge & Iron Co., Cleveland, O.

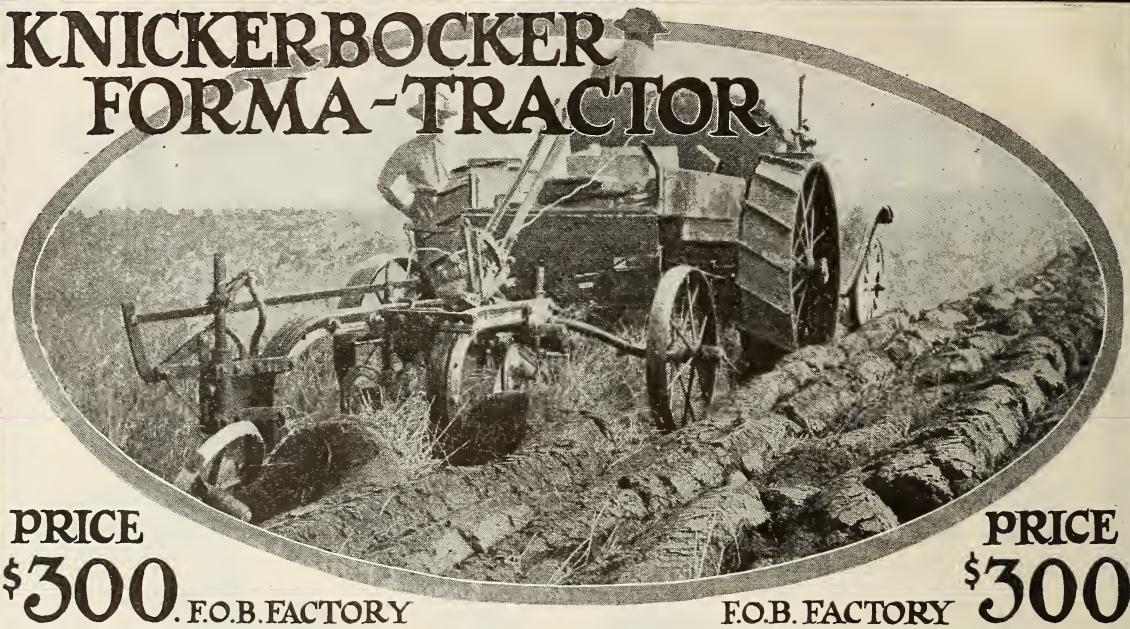
WRENCHES

Bemis & Call, Springfield, Mass.
Billings & Spencer Co., Hartford, Conn.
Chicago Mfg. & Distributing Co., 2608 W. 26th St., Chicago.
Cochran Pipe Wrench Mfg. Co., 7544 South Chicago Ave., Chicago.
Coes Wrench Co., Worcester, Mass.
Keystone Mfg. Co., Buffalo, N. Y.
Frank Mossberg Co., Attleboro, Mass.
Service Station Equipment Co., 1201 Cortland St., Chicago.
Waldon-Worcester Co., Worcester, Mass.
Wiebusch & Hilger, Ltd., New York, N. Y.
The Worth Wire Co., Kokomo, Ind.

WRENCHES (PIPE)

Moore Drop Forging Co., Springfield, Mass.

KNICKERBOCKER FORMA-TRACTOR



PRICE $300. F.O.B. FACTORY

PRICE $300 F.O.B. FACTORY

THE KNICKERBOCKER FORMA-TRACTOR

Is Guaranteed

as to material and workmanship and as to performance. Will give 900 draw-bar pull—sufficient for two 12-inch bottom plows, or any farm implement in ordinary use.

Can be attached to any Ford Car in 30 minutes and detached in 15 minutes, leaving car ready for road use.

The Knickerbocker Forma-Tractor can be used for all tractor purposes on large or small farms, on country estates, and by road builders or contractors.

Can be used for plowing with two 12-inch bottom plows, for harrowing, discing, rolling, drilling, smoothing, pulling stumps, hauling hay, etc., etc.

Three thousand in satisfactory use throughout the United States.

WHY PAY MORE WHEN $300 WILL DO?

Write to us at once for full information.

We Offer Unusual Inducements to Good Dealers

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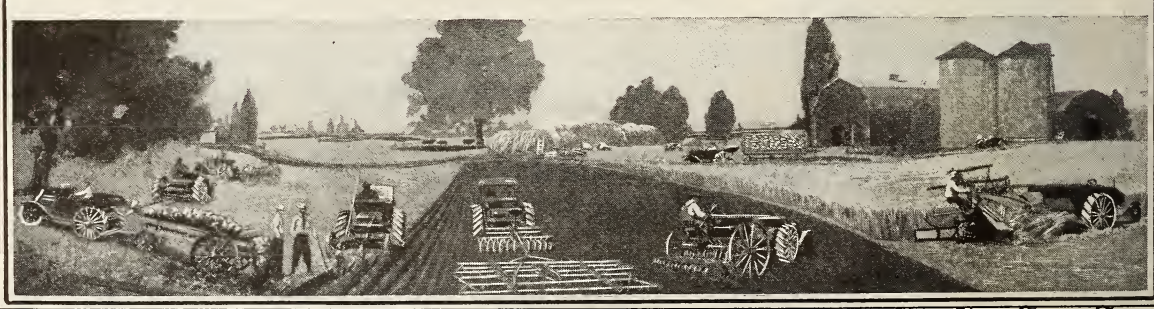
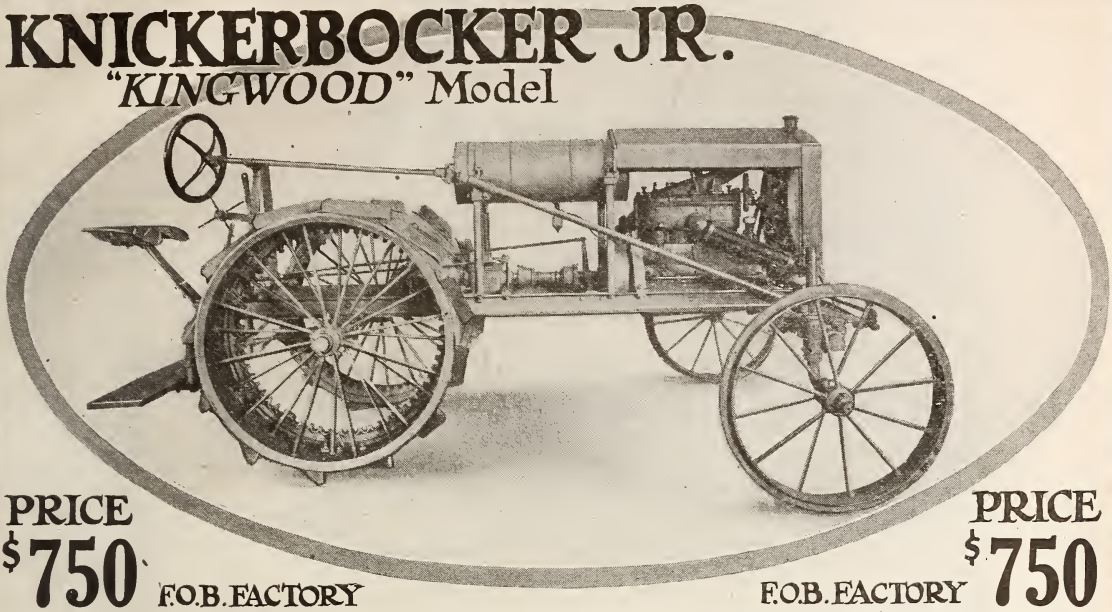
KNICKERBOCKER MOTORS, INC., POUGHKEEPSIE, N. Y.



KNICKERBOCKER JR.

"KINGWOOD" Model



PRICE $750 F.O.B. FACTORY

PRICE $750 F.O.B. FACTORY

THE KNICKERBOCKER JR.

Is a four wheel universal tractor with high clearance for cultivating, capable of handling all general farm tools usually drawn by two horses, such as one 14-inch bottom plow; a standard riding cultivator; a 12-disc harrow, etc., etc.—any farm implement requiring 650 pounds draw-bar pull.

CULTIVATING

The Knickerbocker Jr. Tractor has a very unusual feature in that, while the clearance is nominally 16 inches, this clearance is adjustable and can be increased to a height of 24 inches when necessary. The front axle is also adjustable both as to width of wheels and as to the height.

The Knickerbocker Junior, Kingwood Model, is the only tractor on the market with adjustable clearance and which can be used for all purposes on farm work. The price of $750 puts it within the reach of every farmer.

BELT POWER

A pulley attached to drive shaft will give 10 horse power at the belt for use in sawing wood; filling silos; cutting feed and other work of similar nature around the farm.

The Knickerbocker Junior is the lowest-priced, high-grade, durable, economical tractor made in America.

We Offer Unusual Inducements to Good Dealers

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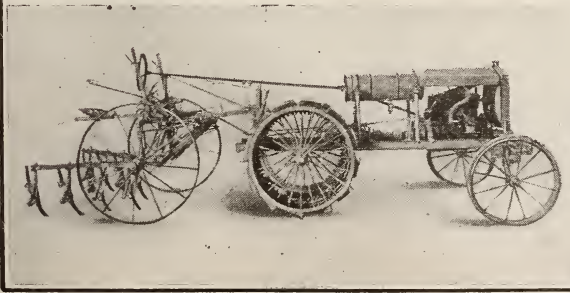
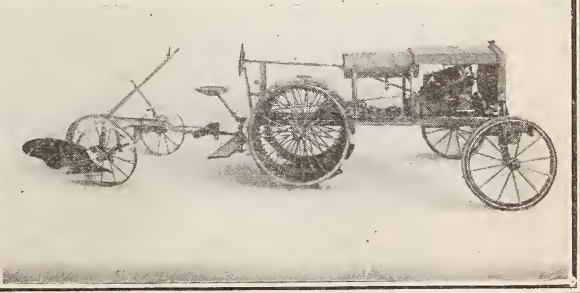
POUGHKEEPSIE, NEW YORK





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Detailed examination of a car, truck, or tractor may reveal initial values. But only the test of service—the supreme test—can reveal the ultimate values which determine whether the investment was good or bad An automotive unit, or any of the secondary units composing it, can be justly judged only on its record of performance.

In America and abroad, in civil and military service, the cars, trucks, tractors, power boats and airplanes with creditable records of duty well done, almost without exception, carry ignition apparatus and lighting generators in which "NORMA" Ball Bearings are used.

Be SURE. See that your Electrical Apparatus is "NORMA" Equipped.

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings

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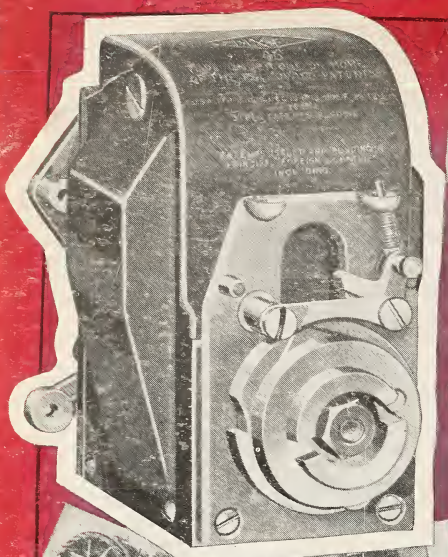
The Great American Magneto



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